



User Manual
cifX Cards Real-Time Ethernet
Installation, Operation and Hardware Description

Hilscher Gesellschaft für Systemautomation mbH

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1 Introduction

1.1 About the User Manual

This user manual provides descriptions of the

- installation,
- operation and
- hardware

of:

1. The cifX cards Real-Time Ethernet under Windows[®] 2000 and Windows[®] XP, PC cards for the Real-Time Ethernet systems:

- EtherCAT,
- EtherNet/IP,
- Open-Modbus/TCP,
- Powerlink,
- PROFINET IO-RT,
- SERCOS III,

as Communication Interface netX

- PCI (CIFX50),
- PCI Express (CIFX 50E),
- Compact PCI (CIFX80),
- Mini PCI (CIFX90),
- Mini PCI Express (CIFX 90E),
- PCI 104 (CIFX 104C),
- PC/104 (CIFX 104).

2. The AIFX assembly and diagnosis interfaces for cifX cards Real-Time Ethernet.



The devices described in this manual are listed in section

- *cifX Cards Real-Time Ethernet* (beginning on page 36) and
- *AIFX Assembly and Diagnosis Interfaces* (on page 37).

These cifX cards and AIFX interfaces are described in detail in the chapters:

- *Device Drawings and Connections* (beginning from page 47),
 - *LEDs* (beginning from page 221) and
 - *Technical Data* (beginning from page 236).
-

1.1.1 Mandatory read Manual



Important!

Read and understand all instructions before installation of the cifX card to avoid injury.
First read the **Safety** chapter.

1.1.2 List of Revisions

Index	Date	Chapter	Revisions
1	17.05.06	all	created
2	13.06.07	2, 4, 7 1, 3, 4, 7, 8	actualized according to ANSI Z 535.6, LED description actualized Descriptions for the cards CIFX 50E-RE, CIFX 90-RE\F, CIFX 104C-RE, CIFX 104C-RE-R, CIFX 104C-RE\F, CIFX 104C-RE-R\F completed, Descriptions for SERCOS III Slave added
3	27.06.07	7.1.3	Description MS and NS LEDs EtherNet/IP Adapter (Slave) adapted
4	01.08.07	all 3.4 – 3.11	EtherCAT Master, EtherNet/IP Scanner (Master) added, Notice to LEDs at RJ45 socket added
5	15.08.07	1.2, 1.3, 1.8, 3.1, 3.3, 5.1, 6 1.8 2.1., 7.1.1, 8.1, 8.2 8.2.3	Information and description to the System configurator SYCON.net added, Information for Master license added, Information for PROFINET IO-RT-Controller added, Protocol data for EtherCAT Master added.
6	15.02.08	All, 1, 2.1, 2.4, 3, 4, 5.4, 6, 7, 8, 9.1.1, 9.1.2, 10.2	Descriptions, data and drawings for the CIFX 80-RE card Descriptions Chapter "Introduction" actualized, Section "Intended Use" actualized, Section "Safety Instructions" actualized, Chapter "Description and Requirements" adapted, Chapter "Getting Started" added, Section "CIFX 104C-RE and CIFS 104C-RE-R" adapted, Chapter "Installing Software" descriptions to the cifX Device Driver and cifX Driver Setup inserted, Chapter "Troubleshooting" actualized, Chapter "Device Drawings and Connections" here inserted and actualized, Section "LEDs PROFINET IO-RT Controller" adapted. Section "LEDs PROFINET IO-RT-Device" actualized. Section "Protocols" actualized,
7	05.05.08	All, 1, 2.1, 3, 4, 5, 6, 7, 11, 12, 14	Descriptions for Powerlink, Open Modbus/TCP and SERCOS III Slave added; Descriptions to the cifX Driver Setup erased, Descriptions to the netX Configuration Tool inserted, Chapte "Introduction" actualized, Section "Intended Use" actualized, Chapter "Description and Requirements" and "Getting startet" actualized, Chapter "Installing CIFS Cards" actualized, Chapter "Installing Software" actualized, Chapter "netX Configuration Tool" added and actualized. Chapter "Technical Data" actualized, Chapter "Configuration Parameter" added and actualized. Glossary added
8	21.05.08	1, 3, 4, 5, 6, 7, 10	Chapte "Introduction" actualized, Chapter "Description and Requirements" actualized, Chapter "Getting startet" actualized, Chapter "Installing CIFS Cards" actualized, Chapter "Installing Software" actualized, Chapter "netX Configuration Tool" added and actualized. Chapter "LEDs" actualized

Further see next page

Index	Date	Chapter	Revisions
9	09.06.08	4.2, 9.11.3, 10.1.7, 11.2, 12	Section "Steps how to install and configure cifX Master Devices" actualized, Section "Use of Hubs and Switches" actualized, Section "LEDs Powerlink Controlled Node/Slave" actualized, Section "Protocols" actualized, Configuration parameters Real-Time Ethernet Systems actualized.,
10	15.07.08	1, 7, 12.1.6	Chapte "Introduction" actualized, Chapter "netX Configuration Tool" actualized. Section "SERCOS III Slave Parameters" actualized.
11	16.01.09	1.1.2 7 12.1	Section "Reference on Hardware, Firmware, Software and Driver" actualized, Chapter "netX Configuration Tool" actualized, Section "Real-Time Ethernet Systems" actualized.
12	04.02.09	3.2.1, 4, 7.6, 11.2.2, 11.2.9, 12.2.1	Section "System Requirements SYCON.net" completed, Chapter "Getting startet" actualized, Section "License" actualized, Section "EtherCAT Slave" actualized, Section "SERCOS III Slave" actualized, Section "EtherCAT Slave Parameter" actualized.
13	11.02.09	1.6.2, 1.6.3, 5.1, 4.16.3 10.1 13.3.2 9.3.1	Section "Device Description Files" actualized, Section "Documentations cifX Cards" actualized, Section "Steps how to install and configure " actualized, Section "Use of Hubs and Switches" actualized, Section "LED at the Real Time Ethernet Devices" actualized. Section "EtherCAT Slave" Note added Section "EtherCAT Slave Parameters" Note added
14	14.05.09	all, 1.1, 1.6, 1.2, 5.1, 8.3, 8.4, 9, 4, 12, 13, 9.3, 14.2, 16	Descriptions added for: the CIFX 90E-RE card, the SERCOS III Master protocol, Section "About the User Manual" actualized, Section "Contents of the Product CD" actualized, Section "Legal Notes" completed, Section "Steps how to install and configure " actualized, Section "Introduction to the Dialog Structure" actualized, Section "Working with netX Configuration Tool" actualized, Section "Configuring Slave Devices using netX Configuration Tool" actualized, Chapters "Device Drawings and Connections", "LEDs" and "Technical Data": LEDs AIFX-RE added, technical data / protocols actualized, Section "Configuration Parameters Real-Time Ethernet Systems" actualized, Chapters "EtherCAT Summary over Vendor ID, Conformance test, Membership and Network Logo" added, Chapter "Glossary" actualized.
15	28.05.09	9.3	Section "Configuration Parameters Real-Time Ethernet Systems" actualized.
16	15.06.09	1.1, 4.20.4	Section "About the User Manual" actualized, Section "Pinning for Mini PCI Express Bus / SYNC Connector, X1/X2" actualized.
17	10.07.09	13.1	Section "Technical Data cifX Cards Real-Time Ethernet " actualized.
18	21.08.09	13.1	Section "Technical Data cifX Cards Real-Time Ethernet " actualized.
19	18.02.10	All, 1.5, 1.6.3, 2, All, 3, 4, 6, 8, 13, 13.2	The cards CIFX 50-RE/Rev 3 added [with Rotary Switch Slot Number (Card ID)], Information added on Rotary Switch Slot Number (Card ID) and DMA Mode , Terms: „Rotary Switch PCI Slot Number“ changed, „cifX Card Fieldbus“ standardized, Sect. <i>Reference on Hardware, Firmware, Software and Driver</i> actualized, Sect. <i>Documentations cifX Cards</i> : revised, Chap. <i>Safety</i> and entire manual: Safety Instructions revised and actualized, Chap. <i>Description and Requirements</i> : revised, Chap. <i>Device Drawings and Connections</i> : Dimensioning AIFX completed, Chap. <i>Installing cifX Card</i> : Figures completed, Chap. <i>Overview netX Configuration Tool</i> : Descriptions Diagnosis revised, Chap. <i>Technical Data</i> : Card Dimensions, Operating Temperature, Power Supply actualized, Sect. <i>PCI IDs cifX Cards on the PCI Bus</i> : completed.

Further see next page

Index	Date	Chapter	Revisions
20	21.05.10	All, 1.5, 3.2.1, 3.2.5, 3.2.6, 4.1, 4.2, 4.20.3, 4.20.4, 6.9, 7.3, 7.4 8, 9, 10, 12.1, 12.12 4.16.3, 11.1, 13.1, 13.3.7, 13.3.10	Descriptions added for: the cards CIFS 104-RE, CIFS 104-RE-R, CIFS 104-REIF, CIFS 104-RE-RIF, Sect. <i>Reference on Hardware, Firmware, Software and Driver</i> actualized, Sections <i>PCI or PC/104 Connector for cifX cards, System Requirements for netX Configuration Tool</i> added, section <i>System Requirements SYCON.net</i> actualized, SYNC connector for CIFS 50-RE (Rev 3) and CIFS 50E-RE added: sections <i>Device Drawing CIFS 50-RE, Device Drawing CIFS 50E-RE, Pinning for SYNC Connector, X51</i> Section <i>"Pinning for Mini PCI Express Bus / SYNC Connector, X1/X2"</i> actualized, For ISA-devices: sections <i>For PC/104 Devices: Set Starting Address and Interrupt, Install CIFS 104 (ISA) – Windows XP, Install CIFS 104 (ISA) – Windows 7</i> added, Chapter <i>„Overview netX Configuration Tool"</i> revised, Chapter <i>„Configuring Slave Devices using netX Configuration Tool"</i> descriptions for the function Conf Template added, default values of the configuration parameters actualized, Chapter <i>„Diagnostic"</i>: descriptions for diagnostic dialog, extended diagnostic and IO Monitor added. Sections <i>Overview LEDs and LEDs SERCOS III Slave</i> actualized, Errata info added: sections <i>Use of Hubs and Switches and Failure in 10 MBit/s Half Duplex Mode and Workaround</i>; Corrections, supplements for UL (Electr. Ratings/ Temp., Hints pollution degree, RJ45 not for LAN) in section <i>Technical Data cifX Cards Real-Time Ethernet</i>; Technical Data actualized: sections <i>PROFINET IO-RT-Controller, SERCOS III Slave</i>
21	09.07.10	All, 1.5, 1.5.1, 1.5.3, 1.5.5, 1.5.6, 1.6.2, 1.6.3, 1.7, 3.1.4, 3.1.5, 3.3.3, 3.3.4, 4, 4.18, 4.20.3, 5, 5.4, 6.4, 6.7, 6.8, 7.1, 7.2.1, 7.6.1, 9.3.3, 9.3.4, 9.3.6, 12.11, 13.3.3, 14.1	cifX Device Driver Version V1.0.x.x., terminology revised (PCI-104 Slot Number instead of PCI-104 Slot Number), Sect. <i>Reference on Hardware, Firmware, Software and Driver</i> note on software upgrade actualized, Section <i>Hardware: cifX Cards Real-Time Ethernet</i> revised, Section <i>Reference on Firmware</i> actualized (Info for PC/104 cards added), Sections <i>References for Slot Number (Card ID)</i> and <i>References for DMA Mode</i> separated, Section <i>Device Description Files</i> actualized, Sect. <i>Documentations cifX Cards, Manuals on Revision List CIFS-DVD and on cifX TCP/IP Server</i> added, Section <i>Important Changes</i> added, Sections <i>The Function „Slot Number (Card ID)"</i> and <i>The Function „DMA Mode"</i> separated, Section <i>Requirements Slot Number (Card ID)</i> actualized and revised, Section <i>Requirements DMA Mode</i> actualized and revised, Chapter <i>Device Drawings and Connections</i> notes on LEDs actualized, notes on SYNC connector added Section <i>Rotary Switch for PCI-104 Slot Number</i> actualized, Section <i>Pinning for SYNC Connector, X51</i> actualized and revised, Section <i>Getting Started</i> installation steps for hardware installation completed, Section <i>Update for Firmware, Driver and Software</i> added, Section <i>CIFS 50-RE and CIFS 50E-RE</i> actualized, Sections <i>CIFS 104C-RE and CIFS 104C-RE-R, CIFS 104C-REIF and CIFS 104C-RE-RIF</i> actualized, Section <i>System Overview</i> added, Section <i>cifX Device Driver from V1.0.0.0</i> added, Section <i>Steps how to install SYCON.net</i> (window <i>„Important Changes SYCONnet"</i> added) , Section <i>Open Modbus/TCP Parameters</i> actualized, Section <i>Command Table Open Modbus/TCP</i> added, Section <i>„PROFINET IO-Device Parameters"</i>: Configuration dialog for the PROFINET IO-Device Parameters under <i>„Data"</i> changed; instead of data length now up to 4 output or input modules, Section <i>LEDs SERCOS III Master</i> actualized, Section <i>EtherNet/IP Scanner (Master)</i> actualized, Section <i>Matrix Label</i> added.

Table 1: List of Revisions

1.2 Legal Notes

1.2.1 Copyright

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1.2.2 Important Notes

The user manual, accompanying texts and the documentation were created for the use of the products by qualified experts, however, errors cannot be ruled out. For this reason, no guarantee can be made and neither juristic responsibility for erroneous information nor any liability can be assumed. Descriptions, accompanying texts and documentation included in the user manual do not present a guarantee nor any information about proper use as stipulated in the contract or a warranted feature. It cannot be ruled out that the user manual, the accompanying texts and the documentation do not correspond exactly to the described features, standards or other data of the delivered product. No warranty or guarantee regarding the correctness or accuracy of the information is assumed.

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1.2.3 Exclusion of Liability

The software was produced and tested with utmost care by Hilscher Gesellschaft für Systemautomation mbH and is made available as is. No warranty can be assumed for the performance and flawlessness of the software for all usage conditions and cases and for the results produced when utilized by the user. Liability for any damages that may result from the use of the hardware or software or related documents, is limited to cases of intent or grossly negligent violation of significant contractual obligations. Indemnity claims for the violation of significant contractual obligations are limited to damages that are foreseeable and typical for this type of contract.

It is strictly prohibited to use the software in the following areas:

- for military purposes or in weapon systems;
- for the design, construction, maintenance or operation of nuclear facilities;
- in air traffic control systems, air traffic or air traffic communication systems;
- in life support systems;
- in systems in which failures in the software could lead to personal injury or injuries leading to death.

We inform you that the software was not developed for use in dangerous environments requiring fail-proof control mechanisms. Use of the software in such an environment occurs at your own risk. No liability is assumed for damages or losses due to unauthorized use.

1.2.4 Warranty

Although the hardware and software was developed with utmost care and tested intensively, Hilscher Gesellschaft für Systemautomation mbH does not guarantee its suitability for any purpose not confirmed in writing. It cannot be guaranteed that the hardware and software will meet your requirements, that the use of the software operates without interruption and that the software is free of errors. No guarantee is made regarding infringements, violations of patents, rights of ownership or the freedom from interference by third parties. No additional guarantees or assurances are made regarding marketability, freedom of defect of title, integration or usability for certain purposes unless they are required in accordance with the law and cannot be limited. Warranty claims are limited to the right to claim rectification.

1.2.5 Export Regulations

The delivered product (including the technical data) is subject to export or import laws as well as the associated regulations of different countries, in particular those of Germany and the USA. The software may not be exported to countries where this is prohibited by the United States Export Administration Act and its additional provisions. You are obligated to comply with the regulations at your personal responsibility. We wish to inform you that you may require permission from state authorities to export, re-export or import the product.

1.2.6 Registered Trademarks

Windows® 2000/Windows® XP/Windows® Vista/ Windows® 7 are registered trademarks of the Microsoft Corporation.

Adobe-Acrobat® is a registered trademark of the Adobe Systems Incorporated.

EtherCAT® is a registered trademark and a patented technology of Beckhoff Automation GmbH, Verl, Bundesrepublik Deutschland, formerly Elektro Beckhoff GmbH.

EtherNet/IP® is a trademark of ODVA (Open DeviceNet Vendor Association, Inc).

Modbus® is a registered trademark of Schneider Electric.

Powerlink is a registered trademark of B&R, Bernecker + Rainer Industrie-Elektronik Ges.m.b.H, Eggelsberg, Austria

PROFINET is a registered trademark of PROFIBUS International, Karlsruhe.

SERCOS interface® is a registered trademark of SERCOS International e. V., Suessen, Germany.

All other mentioned trademarks are property of their respective legal owners.

1.2.7 EtherCAT Disclaimer

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.



To get details and restrictions regarding using the EtherCAT technology refer to the following documents:

- “EtherCAT Marking rules”
- “EtherCAT Conformance Test Policy”
- “EtherCAT Vendor ID Policy”

These documents are available at the ETG homepage www.ethercat.org or directly over info@ethercat.org.

A summary over Vendor ID, Conformance test, Membership and Network Logo can be found within the appendix section of this document under section *EtherCAT Summary over Vendor ID, Conformance test, Membership and Network Logo* on page 255.

1.3 Licenses

If a cifX card is used as a Slave, neither for the firmware nor for the configuration software SYCON.net a license is required.

Licenses are required, if the cifX card is used with

- a firmware with master functionality*.

* The master license includes the card operating as master and the license for the configuration software SYCON.net for the respective card.

1.4 Conventions in this Manual

Operation instructions, a result of an operation step or notes are marked as follows:

Operation Instructions:

➤ <instruction>

Or

1. <instruction>

2. <instruction>

Results:

↻ <result>

Notes:



Important: <important note>



Note: <note>



<note, where to find further information>

1.5 Reference on Hardware, Firmware, Software and Driver



Note on Software Update: The hardware revisions and the versions for the firmware, the driver or the configuration software listed in this section functionally belong together. For existing hardware installation the firmware, the driver and the configuration software must be updated according to the details listed in this section.

For the software upgrade system overview refer to section *Update for Firmware, Driver and Software* on page 75.

1.5.1 Hardware: cifX Cards Real-Time Ethernet

cifX Cards Real-Time Ethernet	Part No.	Hardware Revision	„Rotary Switch Slot Number (Card ID)“ from HW Rev.	„DMA Mode“ from HW Rev.
CIFX 50-RE	1250.100	3	3	1
CIFX 50E-RE	1251.100	3	-	no DMA
CIFX 80-RE	1280.100	2	-	1
CIFX 90-RE\F	1290.100	3	-	1
CIFX 90E-RE\F	1291.100	7	-	no DMA
CIFX 104C-RE	1270.100	4	-	1
CIFX 104C-RE-R	1271.100	4	-	1
CIFX 104C-RE\F	1270.101	4	-	1
CIFX 104C-RE\R\F	1271.101	4	-	1
CIFX 104-RE	1278.100	2	-	PC/104, DMA not possible
CIFX 104-RE-R	1279.100	2	-	
CIFX 104-RE\F	1278.101	2	-	
CIFX 104-RE\R\F	1279.101	2	-	

Table 2: Reference on Hardware cifX Cards Real-Time Ethernet

1.5.2 Hardware: AIFX Assembly and Diagnosis Interfaces

AIFX Interfaces	Part No.	Revision
AIFX-RE	2800.100	2
AIFX-DIAG	2800.000	1

Table 3: Reference on Hardware AIFX Assembly and Diagnosis Interfaces

1.5.3 Reference on Firmware

Firmware File	Real-Time Ethernet System	Firmware Version	Minimum Version for Firmware for PC/104 Cards
CIFXECM.NXF	EtherCAT Master	2.4.x.x	from 2.4.3.0
CIFXECS.NXF	EtherCAT Slave	2.5. x.x	from 2.5.10.0
CIFXEIM.NXF	EtherNet/IP Scanner	2.2. x.x	from 2.2.2.0
CIFXEIS.NXF	EtherNet/IP Adapter	2.3. x.x	from 2.2.3.0
CIFXOMB.NXF	Open-Modbus/TCP	2.3. x.x	from 2.3.1.0
CIFXPLS.NXF	POWERLINK Controlled Node	2.1. x.x	from 2.1.19.0
CIFXPNM.NXF	PROFINET IO Controller	2.4. x.x	from 2.4.10.0
CIFXPNS.NXF	PROFINET IO Device	2.1.44.x (V2)* 3.4.x.x (V3)	- from 3.4.7.0
CIFXS3M.NXF	SERCOS III Master	2.0.x.x	from 2.0.12.0
CIFXS3S.NXF	SERCOS III Slave	3.0.x.x	from 3.0.10.0

Table 4: Reference on Firmware

The downloadable firmware runs on PCI cards and on PC/104 cards too. The firmware automatically detects whether it is running on a PCI card or on a PC/104 board. Precedent cifX firmware is only applicable to PCI cards.



If a precedent cifX firmware (without PC/104 recognition) is loaded in a 104-cifX card, the cifX 104-card gets defective and must be sent to the service! For the PC/104 cards only cifX firmware from the minimum versions may be used as listed in *Table 4: Reference on Firmware*.



Note: *The firmware for PROFINET IO Device V2 does not provide PC/104 recognition!

1.5.4 Reference on Driver and Software

Driver and Software	Version
cifX Device Driver cifX Device Driver Setup.exe	1.0.x.x
Bootloader (is included in the cifX Device Driver Setup)	V1.3.x.x
netX Configuration Tool-Setup netX Configuration Tool.exe	1.0500.x.x
SYCON.net SYCONnet netX setup.exe	V1.300.x.x

Table 5: Reference on Driver and Software

1.5.5 References for Slot Number (Card ID)

For device revisions equipped with a **Rotary Switch Slot Number (Card ID)** the references listed below must be observed in order to:

- a cifX card is identified explicitly by the **cifX Device Driver** via its **Slot Number (Card ID)** and can be distinguished from other cifX cards in the PC.

References:

- Device revisions equipped with a **Rotary Switch Slot Number (Card ID)** are listed separately in section *Hardware: cifX Cards Real-Time Ethernet* on page 17. In *Table 2* the column „**Rotary Switch Slot Number (Card ID)**“ from **HW Rev.** lists any device revisions, which are equipped with a **Rotary Switch Slot Number (Card ID)**. But the required firmware versions must be used, as given in section *Requirements Slot Number (Card ID)* on page 45.
- At least the versions for the driver, the bootloader and the SYCON.net setup listed in section *Requirements Slot Number (Card ID)* on page 45 must be used.



For a summary of the requirements for identifying devices via the **Slot Number (Card ID)** refer to section *Requirements Slot Number (Card ID)* on page 45.

For further information on this question refer to the sections:

- *The Function „Slot Number (Card ID)“* (page 38),
- *Rotary Switch for Slot Number (Card ID)* (page 62),
- *Setting Slot Number (Card ID)* (page 79),
- *Slot Number (Card ID) in the cifX Device Driver Setup* (page 143)
- *Slot Number (Card ID) in the Configuration Software* (page 146).

1.5.6 References for DMA Mode

For device revisions equipped which provide **DMA Mode** the references listed below must be observed in order to:

- the cifX card operates in **DMA Mode**.

References:

- Device revisions which provide **DMA Mode** are listed separately in section *Hardware: cifX Cards Real-Time Ethernet* on page 17. In *Table 2* the column „**DMA Mode**“ from **HW Rev.** lists any device revisions, which provide **DMA Mode**. But the required firmware versions must be used, as given in section *Requirements DMA Mode* on page 46.
- At least the versions for the driver, the bootloader and the SYCON.net setup listed in section *Requirements DMA Mode* on page 46 must be used.



For a summary of the requirements for the **DMA Mode** refer to section *Requirements DMA Mode* on page 46.

For further information on this question refer to the sections:

- *The Function „DMA Mode“* (page 38),
- *Activating DMA Mode in the cifX Device Driver Setup* (page 145).

1.6 Contents of the Product DVD

The Product DVD for the Communication InterFaces cifX contains:

- **cifX Device Driver**
- **netX Configuration Tool setup**
- Configuration Software **SYCON.net**
- Device Description Files (GSDML, EDS, XML, XDD)
- Documentation

1.6.1 Directory Structure of the DVD

All manuals on this DVD are delivered in the Adobe Acrobat® Reader format (PDF).

Directory Name	Description
API	Toolkit, Header Files and cifX32DLL.lib
Documentation	Documentation in the Acrobat® Reader Format (PDF)
Driver	cifX Device Driver
EDS	Device Description File
Firmware	Loadable Firmware
Software	netX Configuration Tool, Configuration Software SYCON.net (configuration and diagnostic program)
Tools	cifXTCPServer

Table 6: Directory Structure of the DVD

1.6.2 Device Description Files

The CIFX DVD **EDS** directory includes the device description files for the following cifX cards Real-Time Ethernet (Slave):

Device Description Files for cifX Cards Real-Time Ethernet (Slave)

cifX Cards Real-Time Ethernet (Slave)	Real-Time Ethernet System	File Name of the Device Description File
CIFX 50-RE CIFX 50E-RE CIFX 80-RE CIFX 90-RE\F CIFX 90E-RE\F CIFX 104C-RE CIFX 104C-RE-R CIFX 104C-RE\F CIFX 104C-RE-R\F CIFX 104-RE CIFX 104-RE-R CIFX 104-RE\F CIFX 104-RE-R\F	EtherCAT Slave	Hilscher cifX RE ECS V2.2.x.xml (or also files with the extension DDF)
	EtherNet/IP Adapter (Slave)	HILSCHER CIFX-RE EIS V1.1.EDS
	Powerlink Controlled Node/Slave	00000044_cifX RE PLS.xdd
	PROFINET IO-RT-Device	GSDML-V2.2-HILSCHER-CIFX RE PNS-20100530.xml
	SERCOS III Slave	Hilscher CIFX RE S3S xxx.xml

Table 7: Device Description Files for cifX Cards Real-Time Ethernet (Slave)

The device description file is required to configure the used Real-Time Ethernet Master device:

- EtherCAT Master device,
- EtherNet/IP Scanner device,
- POWERLINK Managing Node device,
- PROFINET IO Controller device,
- SERCOS III Slave device.

The Real-Time Ethernet system Open Modbus/TCP does not use device description files.

Device Description Files for cifX Cards Real-Time Ethernet (Master)

Furthermore the CIFX DVD EDS directory includes the device description files for the following cifX cards Real-Time Ethernet (Master):

cifX Cards Real-Time Ethernet (Master)	Real-Time Ethernet System	File Name of the Device Description File
CIFX 50-RE CIFX 50E-RE CIFX 80-RE CIFX 90-RE\F CIFX 90E-RE\F CIFX 104C-RE CIFX 104C-RE-R CIFX 104C-RE\F CIFX 104C-RE-R\F CIFX 104-RE CIFX 104-RE-R CIFX 104-RE\F CIFX 104-RE-R\F	EtherNet/IP Scanner (Master)	HILSCHER CIFX-RE EIM V1.0.eds

Table 8: Device Description Files for cifX cards Real-Time Ethernet (Master)

The description files for the EtherNet/IP Master device is needed, when an additional EtherNet/IP Master device shall communicate to a Hilscher EtherNet/IP Master device via EthernetIP.

1.6.3 Documentations cifX Cards

The following documentation overview gives information, for which items you can find further information in which manual.

Manual	Contents	File Name of the Document
User Manual, cifX Cards Real-Time Ethernet	Installation, Operation and Hardware Description	CIFX-RE_usermanual_en.pdf
What's New	Revision List CIFX DVD	What's New - CIFX DVD RL 01 EN.pdf
Operating Instruction Manual cifX Device Driver	Installation and Operation	cifX Device Driver_usermanual_en.pdf
Operating Instruction Manual cifX TCP/IP Server	Diagnosis Connection via Ethernet	cifX TCP-IP-Server_en.pdf
Operating Instruction Manual SYCON.net	SYCON.net Frame Application	SYCONnet_netFrame_en.pdf
	FDT Container	SYCONnet_netDevice_en.pdf
	DTM for EtherCAT Master	EtherCAT_Master_DTM_en.pdf
	Generic EtherCAT Slave DTM for EtherCAT Slave Devices	EtherCAT_Slave_DTM_en.pdf
	DTM for EtherNet/IP Scanner Devices	EtherNetIP_Scanner_DTM_en.pdf
	DTM for EtherNet/IP Adapter Devices	EtherNetIP_Adapter_DTM_en.pdf
	Generic EtherNet/IP Adapter DTM for EtherNet/IP Adapter Devices and Modular Generic EtherNet/IP Adapter DTM for modular EtherNet/IP Adapter Devices	EtherNetIP_GenericAdapter_DTM_en.pdf
	DTM for Hilscher PROFINET IO-Controller	PROFINET_IO_Controller_DTM_en.pdf
	DTM for Hilscher PROFINET IO-Devices	PROFINET_IO_Device_DTM_en.pdf
	Generic DTM for PROFINET IO Devices	PROFINET_IO_GenericDevice_DTM_en.pdf
	DTM for SERCOS III Master Devices	SERCOSIII_Master_DTM_en.pdf
	Generic Slave DTM for SERCOS III Slave Devices	SERCOSIII_Slave_DTM_en.pdf
	netSLAVE DTM for Hilscher NETX Slave Devices	netSlave_DTM_en.pdf
netX Dual-Port Memory Interface for netX based Products	Interface of netX Dual-Port Memory	netX DPM Interface.pdf
EtherCAT Slave Protocol API Manual	Description of EtherCAT Slave Protocol API	EtherCAT Slave Protocol API.pdf (English Version)
EtherCAT Master Protocol API Manual	Description of EtherCAT Master Protocol API	EtherCAT Master Protocol API.pdf (English Version)
EtherNet/IP Adapter Protocol API Manual	Description of EtherNet/IP Adapter Protocol API	EtherNetIP Adapter Protocol API.pdf (English Version)
EtherNet/IP Scanner Protocol API Manual	Description of EtherNet/IP Scanner Protocol API	EtherNetIP Scanner Protocol API.pdf (English Version)
Open Modbus/TCP Protocol API Manual	Description of Open Modbus/TCP Protocol API	OpenModbusTCP Protocol API.pdf (English Version)
Powerlink Controlled node Protocol API Manual	Description of Powerlink Controlled Node Protocol API	Powerlink Controlled Node Protocol API.pdf (English Version)

For more see next page

Manual	Contents	File Name of the Document
PROFINET IO RT Device Protocol API Manual	Description of PROFINET IO RT Device Protocol API (Version 2)	PROFINET IO RT Device Protocol API.pdf (English Version)
PROFINET IO RT IRT Device V3 Protocol API Manual	Description of PROFINET IO RT IRT Device Protocol API (Version 3)	PROFINET IO RT IRT Device Protocol API.pdf (English Version)
PROFINET IO RT Controller Protocol API Manual	Description of PROFINET IO RT Controller Protocol API	PROFINET IO RT Controller Protocol API.pdf (English Version)
SERCOS III Slave Protocol API Manual	Description of SERCOS III Slave Protocol API	SERCOS III Slave Protocol API.pdf (English Version)
SERCOS III Master Protocol API Manual	Description of SERCOS III Master Protocol API	SERCOS III Master Protocol API.pdf (English Version)

Table 9: Documentations cifX Cards Real-Time Ethernet



All these documents are available on the CIFX DVD delivered with the device underneath the directory **Documentation**, in Adobe Acrobat® Reader format (PDF).

1.7 Important Changes



All current version information for hardware and software described in this manual are provided in the folder \Documentation\What's New - CIFS DVD RL 01 EN.pdf on the CIFS-DVD.

1.7.1 PROFINET IO Device Firmware Versions 2.1 und 3.4

The PROFINET IO Device firmware was revised and expanded and now is available in version 3.4.x.x. The PROFINET IO Device firmware V3.4.x.x compared to V2.1.x.x has the following main changes:

- IRT (Class 3 synchronized) is supported (only for netX 100/500)
- Channellnit is also supported now (V2.1.x.x supports only SystemReset)
- The API was revised and is only compatible regarding cyclic data exchange.



If you want to change to V3.4.x.x, then you can read in the **PROFINET IO Device Migration Guide** which changes are necessary in the application program to use version 3.4.x.x.

SYCON.net V1.210.x.x and V1.300.x.x can configure PROFINET IO Device Firmware V2.1.x.x as well as V3.4.x.x.

The development of the PROFINET IO Device firmware V2.1.x.x will not be continued.

On the CIFS DVD are both versions V3.4.x.x and V2.1.x.x available in the directory firmware.

	PROFINET IO Device V3, Directory on the DVD \ File:	PROFINET IO Device V2, Directory on the DVD \ File:
Firmware	<i>Firmware\CIFS\cifxpns.nxf</i>	<i>Firmware\CIFS\PROFINET IO Device V2\cifxpns.nxf*</i>
Header	<i>API\Header\Firmware\PROFINET IO IRT RT Device V3</i>	<i>API\Header\Firmware\PROFINET IO RT Device V2</i>
GSDML	<i>DVD:\EDS\PROFINET\ GSDML-V2.2-HILSCHER-CIFS RE PNS-20100530.xml</i>	<i>EDS\PROFINET\PROFINET IO RT Device V2 GSDML-V2.1-HILSCHER-CIFS RE PNS-20081210.xml</i>
Protocol API	<i>API\Protocol\PROFINET IO IRT RT Device V3 PROFINET IO RT IRT Device Protocol API xx EN.pdf</i> Migration Guide: PROFINET IO-Device - Version 2 to Version 3 MG xx EN.pdf	<i>API\Protocol\PROFINET IO RT Device V2 PROFINET IO RT Device V2 Protocol API xx EN.pdf</i>

Table 10: PROFINET IO Device Firmware Version 2.1 and 3.4, further Header, GSDML and Protocol API



Note: *The firmware for PROFINET IO Device V2 does not provide PC/104 recognition!



Important! The PROFINET IO-Device Firmware V2.1.x.x cannot be configured by the netX Configuration Tool version 1.0500.1.1564 any more, but only the PROFINET IO Device firmware versions from V3.x.x.x on and higher. The firmware version 2.1.x.x can only be configured with the netX Configuration Tool up to the Version 1.0500.1.1564.

2 Safety

2.1 General Note

The user manual, the accompanying texts and the documentation are written for the use of the products by educated personnel. When using the products, all safety instructions and all valid legal regulations have to be obeyed. Technical knowledge is presumed. The user has to assure that all legal regulations are obeyed.

2.2 Intended Use

2.2.1 cifX Cards Real-Time Ethernet

The cifX cards described in this user manual are PC cards for real-time Ethernet communication. Depending from the loaded firmware, the Real-Time Ethernet systems listed in the following table can be realized using the respective cifX card.

cifX cards Real-Time Ethernet	Real-Time Ethernet System
CIFX 50-RE	EtherCAT Master
CIFX 50E-RE	EtherCAT Slave
CIFX 80-RE	EtherNet/IP Scanner (Master) EtherNet/IP Adapter (Slave)
CIFX 90-RE\F	
CIFX 90E-RE\F	Open Modbus/TCP
CIFX 104C-RE	
CIFX 104C-RE-R	Powerlink Controlled Node/Slave
CIFX 104C-RE\F	
CIFX 104C-RE-R\F	PROFINET IO-RT-Controller PROFINET IO-RT-Device
CIFX 104-RE	
CIFX 104-RE-R	SERCOS III Master SERCOS III Slave
CIFX 104-RE\F	
CIFX 104-RE-R\F	

Table 11: cifX Cards Real-Time Ethernet and Real-Time Ethernet Systems realized thereby

2.2.2 AIFX Assembly and Diagnosis Interfaces

The assembly interface AIFX-RE and diagnosis interface AIFX-DIAG are attached to the respective cifX card via cable connectors. Thereby the cifX card is equipped with a field bus or with a diagnosis interface.

AIFX Interface	cifX cards Real-Time Ethernet with cable connector (label „\F“)
AIFX-RE	CIFX 90-RE\F CIFX 90E-RE\F CIFX 104C-RE\F CIFX 104C-RE-R\F CIFX 104-RE\F CIFX 104-RE-R\F
AIFX-DIAG	CIFX 104C-RE\F CIFX 104C-RE-R\F CIFX 104-RE\F CIFX 104-RE-R\F

Table 12: AIFX Assembly and Diagnosis Interfaces

2.3 Personnel Qualification

The cifX card must only be installed, configured and removed by qualified personnel. Job-specific technical skills for people professionally working with electricity must be present concerning the following topics:

- Safety and health at work
- Mounting and connecting of electrical equipment
- Measurement and Analysis of electrical functions and systems
- Evaluation of the safety of electrical systems and equipment
- Installing and Configuring IT systems

2.4 Commitment to read and understand the Manual



Important! Read and understand all instructions in this manual before installation or use of your device to avoid injury.

2.5 References Safety

- [1] ANSI Z535.6-2006 American National Standard for Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials
- [2] IEC 60950-1, Information technology equipment - Safety - Part 1: General requirements, (IEC 60950-1:2005, modified); German Edition EN 60950-1:2006
- [3] EN 61340-5-1 and EN 61340-5-2 as well as IEC 61340-5-1 and IEC 61340-5-2

2.6 Labeling of Safety Instructions

The safety instructions are pinpointed particularly. The instructions are highlighted with a specific safety symbol, a warning triangle and a signal word according to the degree of endangerment. Inside the note the danger is exactly named. Instructions to a property damage message do not contain a warning triangle.

Symbol	Symbol (USA)	Sort of Warning or Principle
		Warning of Personal Injury
		Warning of Lethal Electrical Shock
		Warning of danger by electrical current
		Warning of damages by electrostatic discharge
		Principle: Disconnect the power plug
		Principle: Mandatory read Manual

Table 13: Safety Symbols and Sort of Warning or Principle

Signal Word	Meaning	Signal Word (USA)	Meaning (USA)
DANGER	Indicates a direct hazard with high risk, which will have as consequence death or grievous bodily harm if it isn't avoided.		Indicates a Hazardous Situation Which, if not Avoided, will Result in Death or Serious Injury.
WARNING	Indicates a possible hazard with medium risk, which will have as consequence death or (grievous) bodily harm if it isn't avoided.		Indicates a Hazardous Situation Which, if not Avoided, could Result in Death or Serious Injury.
CAUTION	Indicates a minor hazard with medium risk, which could have as consequence simple battery if it isn't avoided.		Indicates a Hazardous Situation Which, if not Avoided, may Result in Minor or Moderate Injury.
NOTICE	Indicates a Property Damage Message.		Indicates a Property Damage Message.
Note	Indicates an important note in the manual.	Note	Indicates an Important Note in the Manual.

Table 14: Signal Words

In this document the safety instructions and property damage messages are designed according both to the international used safety conventions as well as to the ANSI standard, refer to reference safety [1].

2.7 Safety Instructions

To ensure your own personal safety and to avoid personal injury, you necessarily must read, understand and follow the following and all other safety instructions in this guide.

2.7.1 Electrical Shock Hazard



DANGER!



Lethal Electrical Shock caused by parts with more than 50V!

- HAZARDOUS VOLTAGE inside of the PC or of the connecting device.
 - Therefore first disconnect the power plug of the PC or of the connecting device.
 - Make sure, that the power supply is off at the PC or at the connecting device.
 - Open the PC cabinet and install or remove the cifX card only after disconnecting power.
-

USA:



⚠ DANGER

Lethal Electrical Shock caused by parts with more than 50V!



- HAZARDOUS VOLTAGE inside of the PC or of the connecting device.
 - Therefore first disconnect the power plug of the PC or of the connecting device.
 - Make sure, that the power supply is off at the PC or at the connecting device.
 - Open the PC cabinet and install or remove the cifX card only after disconnecting power.
-

An electrical shock is the result of a current flowing through the human body. The resulting effect depends on the intensity and duration of the current and on its path through the body. Currents in the range of approximately ½ mA can cause effects in persons with good health, and indirectly cause injuries resulting from startle responses. Higher currents can cause more direct effects, such as burns, muscle spasms, or ventricular fibrillation.

In dry conditions permanent voltages up to approximately 42.4 V peak or 60 V DC are not considered as dangerous, if the contact area is equivalent to a human hand.

Reference Safety [2]

2.8 Property Damage Messages

To avoid property damage respectively device destruction to the card and to your system, you necessarily must read, understand and follow the following and all other property damage messages in this guide.

2.8.1 Device Destruction by exceeding allowed Supply Voltage

For the devices

- CIFX 50-RE
- CIFX 50E-RE
- CIFX 80-RE
- CIFX 90-RE\F
- CIFX 90E-RE\F

you must follow this:

The cifX card may not be powered by a 5V supply voltage! The cifX card may only be powered by a 3.3 V supply voltage. The use of a higher supply voltage than 3.3V may result in severe damage to the cifX card!



NOTICE

Device Destruction!

- Use only 3.3 V for supply voltage to operate the card.
Operation with 5 V supply voltage leads to device destruction.
-

USA:



NOTICE

Device Destruction!

- Use only 3.3 V for supply voltage to operate the card.
Operation with 5 V supply voltage leads to device destruction.
-

2.8.2 Device Destruction by exceeding allowed Signaling Voltage

Adhere for all cifX cards described in this manual the instruction hereafter:



NOTICE

Device Destruction!

- All I/O signal pins at the cifX card tolerate only a specified signaling voltage!
 - Operation with a signaling voltage other than the specified signaling voltage may lead to severe damage to the cifX card!
-

For detailed information on the supply and signaling voltage of the cifX cards described in this manual, refer to section *Supply and Signal Voltage* on page 42.

USA:



NOTICE

Device Destruction!

- All I/O signal pins at the cifX card tolerate only a specified signaling voltage!
 - Operation with a signaling voltage other than the specified signaling voltage may lead to severe damage to the cifX card!
-

2.8.3 Electrostatically sensitive Devices

Adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge.

**NOTICE**

Electrostatically sensitive Devices

This equipment is sensitive to electrostatic discharge, which cause internal damage and affect normal operation. Follow guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
 - Wear an approved grounding wriststrap.
 - Do not touch connectors or pins on component boards.
 - Do not touch circuit components inside the equipment.
 - If available, use a static-safe workstation.
 - When not in use, store the equipment in appropriate static-safe packaging.
-

USA:

**NOTICE**

Electrostatically sensitive Devices

This equipment is sensitive to electrostatic discharge, which cause internal damage and affect normal operation. Follow guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
 - Wear an approved grounding wriststrap.
 - Do not touch connectors or pins on component boards.
 - Do not touch circuit components inside the equipment.
 - If available, use a static-safe workstation.
 - When not in use, store the equipment in appropriate static-safe packaging.
-

Reference Safety [2]

3 Description and Requirements

3.1 Description

These cifX cards Real-Time Ethernet are PC cards for Real-Time Ethernet communication. Depending of the loaded firmware, the protocol specific cifX card proceeds the communication of the corresponding Real-Time Ethernet system.

The following Real-Time Ethernet systems are used:

- EtherCAT Master
- EtherCAT Slave
- EtherNet/IP Scanner (Master)
- EtherNet/IP Adapter (Slave)
- Open Modbus/TCP
- Powerlink Controlled Node/Slave
- PROFINET IO-RT-Controller
- PROFINET IO-RT-Device
- SERCOS III Master
- SERCOS III Slave

The cifX cards Real-Time Ethernet handles the complete data exchange between the connected Real-Time Ethernet devices and the PC. The data exchange is proceeded via dual-port memory.

3.1.1 Devices described in this Manual

In this manual are described:

1. The cifX cards Real-Time Ethernet, PC cards for the Real-Time Ethernet systems:

- EtherCAT,
- EtherNet/IP,
- Open-Modbus/TCP,
- Powerlink,
- PROFINET IO-RT,
- SERCOS III,

as Communication Interface netX with PCI Bus

- PCI (CIFX50),
- PCI Express (CIFX 50E),
- Compact PCI (CIFX80),
- Mini PCI (CIFX90),
- Mini PCI Express (CIFX 90E),
- PCI 104 (CIFX 104C).

as Communication Interface netX with ISA Bus

- PC/104 (CIFX 104).

2. The AIFX assembly and diagnosis interfaces for cifX cards Real-Time Ethernet.



The devices described in this manual are listed in section

- *cifX Cards Real-Time Ethernet* (beginning on page 36) and
- *AIFX Assembly and Diagnosis Interfaces* (on page 37).

These cifX cards and AIFX interfaces are described in detail in the chapters:

- *Device Drawings and Connections* (beginning from page 47),
 - *LEDs* (beginning from page 221) and
 - *Technical Data* (beginning from page 236).
-

3.1.2 cifX Cards Real-Time Ethernet

cifX Card Real-Time Ethernet	Description
CIFX 50-RE	PCI card for Real-Time Ethernet Master or Slave
CIFX 50E-RE	PCI Express card for Real-Time Ethernet Master or Slave
CIFX 80-RE	Compact PCI card for Real-Time Ethernet Master or Slave
CIFX 90-RE\F	Mini PCI card for Real-Time Ethernet Master or Slave - with cable connector Ethernet for assembly interface Real-Time Ethernet AIFX-RE, Note: The device height and the power input of the Mini PCI card CIFX 90-RE\F do not comply with the standard specifications.
CIFX 90E-RE\F	Mini PCI Express card for Real-Time Ethernet Master or Slave - with cable connector Ethernet for assembly interface Real-Time Ethernet AIFX-RE, Note: The device height and the power input of the Mini PCI Express card CIFX 90E-RE\F do not comply with the standard specifications.
CIFX 104C-RE	PCI 104 card for Real-Time Ethernet Master or Slave
CIFX 104C-RE-R	PCI 104 card for Real-Time Ethernet Master or Slave (connectors at the left side)
CIFX 104C-RE\F	PCI 104 card for Real-Time Ethernet Master or Slave - with cable connector Ethernet for assembly interface Real-Time Ethernet AIFX-RE - and cable connector DIAG for diagnosis interface AIFX-DIAG.
CIFX 104C-RE-R\F	PCI 104 card for Real-Time Ethernet Master or Slave (connectors at the left side) - with cable connector Ethernet for assembly interface Real-Time Ethernet AIFX-RE - and cable connector DIAG for diagnosis interface AIFX-DIAG.
CIFX 104-RE	PC/104 card for Real-Time Ethernet Master or Slave
CIFX 104-RE-R	PC/104 card for Real-Time Ethernet Master or Slave (connectors at the right side)
CIFX 104-RE\F	PC/104 card for Real-Time Ethernet Master or Slave - with cable connector Ethernet for assembly interface Real-Time Ethernet AIFX-RE - and cable connector DIAG for diagnosis interface AIFX-DIAG.
CIFX 104-RE-R\F	PC/104 card for Real-Time Ethernet Master or Slave (connectors at the right side) - with cable connector Ethernet for assembly interface Real-Time Ethernet AIFX-RE - and cable connector DIAG for diagnosis interface AIFX-DIAG.

Table 15: cifX Cards Real-Time Ethernet



Note: The cifX cards including the label “\F” in its device name are equipped with a **Cable Connector Ethernet**, to connect the assembly interface AIFX-RE. The variants of the cifX cards CIFX 104C-RE or CIFX 104-RE with the label “\F” in its device name are additionally equipped with a **Cable Connector DIAG**, to optionally connect the diagnosis interface AIFX-DIAG.

3.1.3 AIFX Assembly and Diagnosis Interfaces

AIFX Interface	Description
AIFX-RE	Assembly interface with Ethernet Interface for the devices: CIFX 90-RE\F, CIFX 90E-RE\F, CIFX 104C-RE\F, CIFX 104C-RE-R\F, CIFX 104-RE\F, CIFX 104-RE-R\F
AIFX-RE and optional AIFX-DIAG	Assembly interface with Ethernet Interface and optionally with Diagnosis Interface for the devices: CIFX 104C-RE\F, CIFX 104C-RE-R\F, CIFX 104-RE\F, CIFX 104-RE-R\F

Table 16: AIFX Interfaces for cifX Cards with Cable Connector

The assembly Interface AIFX-RE and optionally the diagnosis interface AIFX-DIAG are connected to the cifX cards with **Cable Connector Ethernet** or **Cable Connector DIAG**. The cifX cards with cable connector include the label "\F" in its device name. The variants of the cifX cards CIFX 104C-RE or CIFX 104-RE with the label "\F" in its device name are additionally equipped with a **Cable Connector DIAG**.



Note: When the diagnosis interface AIFX-DIAG is used, the assembly interface AIFX-RE must be installed also.

3.1.4 The Function „Slot Number (Card ID)“



Note: The functions **Slot Number (Card ID)** and **DMA Mode** are in technical view independently from each other.

The **Slot Number (Card ID)** must be set at the cifX card using the **Rotary Switch Slot Number (Card ID)**. The **Slot Number (Card ID)** serves to distinguish cifX cards from each other clearly, especially if more cifX cards are installed into the very same PC.

Device revisions equipped with a **Rotary Switch Slot Number (Card ID)** are listed separately in section *Hardware: cifX Cards Real-Time Ethernet* on page 17.



For further information about the **Slot Number (Card ID)** and the **DMA Mode** refer to the sections:

- *References for Slot Number (Card ID)* (page 19),
- *Requirements Slot Number (Card ID)* (page 45),
- *Rotary Switch for Slot Number (Card ID)* (page 62),
- *Setting Slot Number (Card ID)* (page 79),
- *Slot Number (Card ID) in the cifX Device Driver Setup* (page 143)
- *Slot Number (Card ID) in the Configuration Software* (page 146).

3.1.5 The Function „DMA Mode“



Note: The functions **Slot Number (Card ID)** and **DMA Mode** are in technical view independently from each other.

The **DMA Mode** is activated via the device driver **cifX Device Driver**.

Device revisions which provide **DMA Mode** are listed separately in section *Hardware: cifX Cards Real-Time Ethernet* on page 17.



For further information about the **Slot Number (Card ID)** and the **DMA Mode** refer to the sections:

- *References for DMA Mode* (page 19),
- *Requirements DMA Mode* (page 46),
- *Activating DMA Mode in the cifX Device Driver Setup* (page 145).

3.2 System Requirements

3.2.1 PCI or PC/104 Connector for cifX cards

PC with PCI connector (3.3 V) or PC/104 connector (5V)

Type of Card	PCI Connector or PC/104 Connector
CIFX 50-RE	PCI slot (3.3 V)
CIFX 50E-RE	PCI Express X1 slot (3.3 V), X1 = Single Lane
CIFX 80-RE	Compact PCI Socket (3.3 V)
CIFX 90-RE\F	Mini PCI Socket (3.3 V), Type III System Connector
CIFX 90E-RE\F	PCI Express Mini Card System Connector (3.3 V) X1/X2 = Single Lane
CIFX 104C-RE CIFX 104C-RE-R CIFX 104C-RE\F CIFX 104C-RE-R\F	PCI-104 Slot (3.3 V)
CIFX 104-RE CIFX 104-RE-R CIFX 104-RE\F CIFX 104-RE-R\F	PC/104 Slot (5 V)

Table 17: PCI or PC/104 Connector for cifX cards

3.2.2 Data on the overall Card Height for CIFS 90-RE\F and CIFS 90E-RE\F

Card Type	Dimensions (L x B x D)	Note
CIFS 90-RE\F	60,0 x 45 x 9,5 mm	The height of the card elements on top of the mini-PCI card CIFS 90-RE\F do not meet the standard specifications.
CIFS 90E-RE\F	51 x 30 x 11 mm The total height of the card (D) is composed from: + 3,5 mm (=card height) + 6,4 mm (=netX 100 cooling element) + 1,3 mm (=element height bottom side) = ~ 11 mm Total height of the card (D)	The height of the card elements on top of the mini-PCI Express card CIFS 90E-RE\F does not meet the standard specifications. Note: The element height at the bottom side of the Mini PCI Express card CIFS 90E-RE\F is in accordance with the standard specifications. As the CIFS 90E-RE\F-card can be inserted correctly into the mini-PCI Express card slot, the element height in the Mini-PCI Express card slot of the connecting device must meet to the standard guidelines.

Table 18: Data on the overall Card Height for CIFS 90-RE\F and CIFS 90E-RE\F

3.2.3 Panel Cutout for AIFX Mounting

In order to connect the AIFX assembly or diagnosis interface to a cifX card with AIFX connector (labeling „\F“), make sure that the housing panel of the PC or the front plate of the cifX has appropriate cutout and holes for fastening the AIFX. The panel cutout must be dimensioned sufficiently large for the interface, display or control elements placed on the AIFX. Partial standard cutouts can be used.

Card Type	Panel Cutout
CIFX 90-RE\F CIFX 90E-RE\F	at the housing panel of the PC
CIFX 104C-RE\F CIFX 104C-RE-R\F CIFX 104-RE\F CIFX 104-RE-R\F	on the front plate of the cifX card

Table 19: Panel Cutout at the at the housing panel of the PC or on the front plate of the cifX card

Card Type	AIFX	Panel Cutout and Holes	
CIFX 90-RE\F CIFX 90E-RE\F CIFX 104C-RE\F CIFX 104C-RE-R\F CIFX 104-RE\F CIFX 104-RE-R\F	AIFX-RE	Required Cutout	for two RJ45 Sockets Important! The panel cutout layout must also cover the LEDs COM 0 and COM1 at the AIFX-RE.
		Standard cutout	D-Sub-15
		Holes	2, distance between the holes 37,3 mm
		Further Information	In the data sheet <i>MOD JACK – MJIM</i> [6], as well as in section <i>AIFX-RE Dimensioning</i> on page 55.
CIFX 104C-RE\F CIFX 104C-RE-R\F CIFX 104-RE\F CIFX 104-RE-R\F	AIFX-DIAG	Required Cutout	for the light channels, the rotary switches and the Mini B USB plug
		Standard cutout	-
		Holes	2, distance between the holes 47,1 mm
		Further Information	in section <i>AIFX-DIAG Dimensioning</i> on page 57.

Table 20: Required Panel Cutout and Holes for AIFX

3.2.4 Supply and Signal Voltage

The following table provides the required and permissible supply voltage for each of the devices as well as the required or tolerated signal voltage for the I/O signal pins:

Card Type	Supply Voltage	Signal Voltage
CIFX 50-RE	+3.3 V dc $\pm 5\%$ /max. 650 mA	5 V or 3.3 V
CIFX 50E-RE	+3.3 V dc $\pm 5\%$ /max. 800 mA	PCIe compatible
CIFX 80-RE	+3.3 V dc $\pm 5\%$ /max. 650 mA	5 V or 3.3 V
CIFX 90-RE\F	+3.3 V dc $\pm 5\%$ /max. 650 mA	5 V or 3.3 V
CIFX 90E-RE\F	+3.3 V dc $\pm 5\%$ /max. 800 mA	PCIe compatible
CIFX 104C-RE CIFX 104C-RE-R CIFX 104C-RE\F CIFX 104C-RE-R\F	+5 V dc $\pm 5\%$ /max. 500 mA order +3.3 V dc $\pm 5\%$ /max. 730 mA	5 V or 3.3 V
CIFX 104-RE CIFX 104-RE-R CIFX 104-RE\F CIFX 104-RE-R\F	+5 V dc $\pm 5\%$ /max. 500 mA	5 V Input compatible, 5 V TTL Output compatible ($U_{out} \geq 2,4\text{ V @ }6\text{ mA}$)

Table 21: Supply and Signal Voltage

3.2.5 System Requirements for netX Configuration Tool

The system requirements necessary for the application of the **netX Configuration Tool** are these:

- PC with 586-, Pentium® processor or higher
- Operating system: Windows® 2000 or Windows® XP
- Free space on hard disk: 50 MByte
- DVD drive
- RAM: min. 256 MByte
- Graphics resolution: min 1024 x 768 pixels
- Keyboard and mouse for input and operation

3.2.6 System Requirements SYCON.net

- PC with 1 GHz processor or higher
- Windows® 2000 and Windows® XP
- Internet Explorer 5.5 or higher
- Free disk space: min. 400 MByte
- DVD ROM drive
- RAM: min. 512 MByte, recommended 1024 MByte
- Graphic resolution: min. 1024 x 768 pixel
- Keyboard and Mouse



Note: If the project file is saved and opened again or it is used on another PC, the system requirements need to match. Particularly the DTMs need to be installed on the used PC.

3.3 Requirements for Operation



Note: Upgrade older versions of the **cifX Device Driver** necessarily on the version **V1.0.x.x**.

3.3.1 cifX Cards Real-Time Ethernet (Slave)

For cifX cards Real-Time Ethernet (Slave) to operate properly, the following requirements must be fulfilled:

Protocols	EtherCAT Slave, EtherNet/IP-Adapter (Slave), Open Modbus/TCP, Powerlink Controlled Node/Slave, PROFINET IO-Device, SERCOS III Slave
Software Installation	1. The cifX Device Driver must be installed (from V1.0.x.x). 2. The netX Configuration Tool program must be installed or alternatively the configuration software SYCON.net or another application program by which the cifX card Real-Time Ethernet (Slave) can be parameterized.
Firmware-Download	3. Using the netX Configuration Tool program, the user must select the firmware which is to be loaded to the cifX card Real-Time Ethernet (Slave).
Parameter Setting	4. The cifX card Real-Time Ethernet (Slave) must be parameterized using one of the following options: • netX Configuration Tool program • Application program (programming required)
Communication	5. For the communication a Master for the respective communication system is required.

Table 22: Requirements for Operation of cifX Cards Real-Time Ethernet (Slave)

3.3.2 cifX Cards Real-Time Ethernet (Master)

For cifX cards Real-Time Ethernet (Master) to operate properly, the following requirements must be fulfilled:

Protocols	EtherCAT Master, EtherNet/IP-Scanner (Master), PROFINET IO-Controller SERCOS III Master
Software Installation	1. The cifX Device Driver must be installed (from V1.0.x.x). 2. The configuration software SYCON.net must be installed or another application program by which the cifX card Real-Time Ethernet (Master) can be configured.
Firmware-Download	3. Using the configuration software SYCON.net , the user must select the firmware which is to be loaded to the cifX cards Real-Time Ethernet (Master).
Configuration	4. The cifX cards Real-Time Ethernet (Master) must be configured using one of the following options: • Configuration Software SYCON.net • Application program (programming required)
Communication	5. For the communication Slaves devices for the used communication system are required.

Table 23: Requirements for Operation of cifX Cards Real-Time Ethernet (Master)

3.3.3 Requirements Slot Number (Card ID)

The requirements given in the subsequent table must be met in order to:

- a cifX card is identified explicitly by the **cifX Device Driver** via its **Slot Number (Card ID)** and can be distinguished from other cifX cards in the PC.

cifX Card	From Hardware Revision	Firmware File	Real-Time Ethernet System	From Firmware Version
CIFX 50-RE	3	CIFXECM.NXF	EtherCAT Master	2.4.3.x
		CIFXECS.NXF	EtherCAT Slave	2.5.5.x
		CIFXOMB.NXF	Open-Modbus/TCP	2.3.3.0
		CIFXPNM.NXF	PROFINET IO Controller	2.3.x.x
		CIFXS3M.NXF	SERCOS III Master	2.0.9.0
		CIFXS3S.NXF	SERCOS III Slave	3.0.8.0

Table 24: Requirements Slot Number (Card ID): Hardware and Firmware

Driver and Software		Version or higher
cifX Device Driver	cifX Device Driver Setup.exe	0.95x
Bootloader (is included in the cifX Device Driver Setup)		V1.3.x.x
SYCON.net	SYCONnet netX setup.exe	V1.201.x.x

Table 25: Requirements Slot Number (Card ID): Driver and Software



For further information on the question **Slot Number (Card ID)** refer to the sections:

- *References for Slot Number (Card ID)* (page 19),
- *The Function „Slot Number (Card ID)“* (page 38),
- *Rotary Switch for Slot Number (Card ID)* (page 62),
- *Setting Slot Number (Card ID)* (page 79),
- *Slot Number (Card ID) in the cifX Device Driver Setup* (page 143)
- *Slot Number (Card ID) in the Configuration Software* (page 146).

3.3.4 Requirements DMA Mode

In order to operate the cifX cards in **DMA Mode** the requirements given in the subsequent table must be met:

cifX Card Real-Time-Ethernet	From Hardware Revision	Firmware File	Real-Time Ethernet System	From Firmware Version
CIFX 50-RE, CIFX 80-RE, CIFX 90-RE\F, CIFX 104C-RE, CIFX 104C-RE-R, CIFX 104C-RE\F, CIFX 104C-RE-R\F	1	CIFXECM.NXF	EtherCAT Master	For future application only.
		CIFXECS.NXF	EtherCAT Slave	2.5.5.0
		CIFXEIM.NXF	EtherNet/IP Scanner	2.2.x.x
		CIFXEIS.NXF	EtherNet/IP Adapter	2.3.x.x
		CIFXOMB.NXF	Open-Modbus/TCP	For future application only.
		CIFXPLS.NXF	POWERLINK Controlled Node	For future application only.
		CIFXPNM.NXF	PROFINET IO Controller	2.3.x.x
		CIFXPNS.NXF	PROFINET IO Device	3.4.x.x (V3)
		CIFXS3M.NXF	SERCOS III Master	For future application only.
		CIFXS3S.NXF	SERCOS III Slave	For future application only.
CIFX 50E-RE, CIFX 90E-RE\F	No DMA	-	-	-

Table 26: Requirements DMA Mode: Hardware and Firmware

Driver and Software		Version or higher
cifX Device Driver	cifX Device Driver Setup.exe	0.95x
SYCON.net	SYCONnet netX setup.exe	V1.201.x.x

Table 27: Requirements DMA Mode: Driver and Software



For further information on the question **DMA Mode** refer to the sections:

- *References for Slot Number (Card ID)* (page 19),
- *The Function „DMA Mode“* (page 38),
- *Activating DMA Mode in the cifX Device Driver Setup* (page 145).

4 Device Drawings and Connections

4.1 Device Drawing CIFX 50-RE

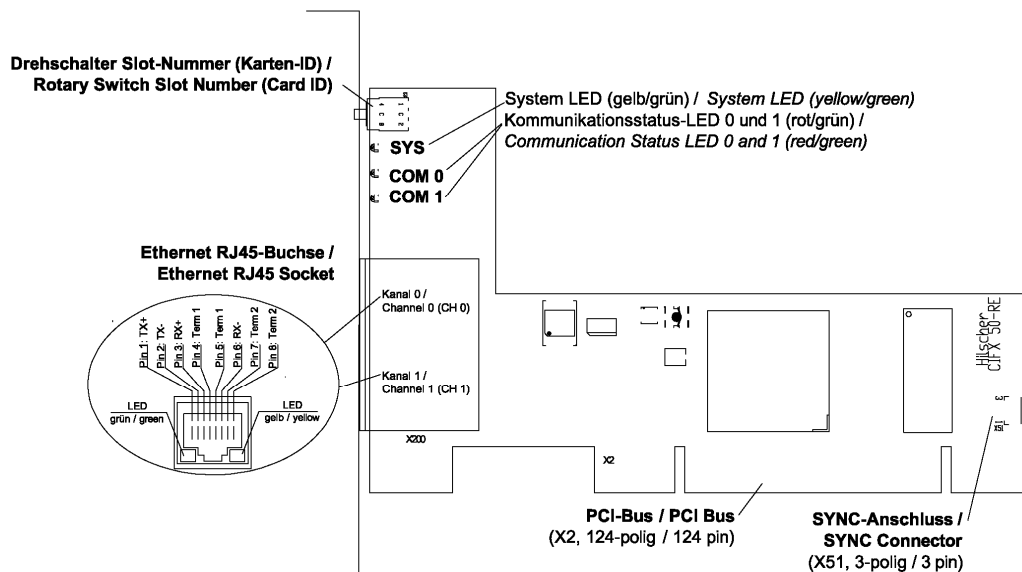


Figure 1: Device Drawing CIFX 50-RE
(hardware revision 3, with Rotary Switch Slot Number (Card ID))

The meaning of the LEDs depends from the loaded firmware. See chapter *LEDs* beginning from page 221. For the SYNC pinning refer to section *Pinning for SYNC Connector, X51* on page 65.

Note:

Device supports Auto Crossover Function

Note:

With loaded Open Modbus/TCP or EtherCAT Master firmware only channel 0 can be used, channel 1 is deactivated.

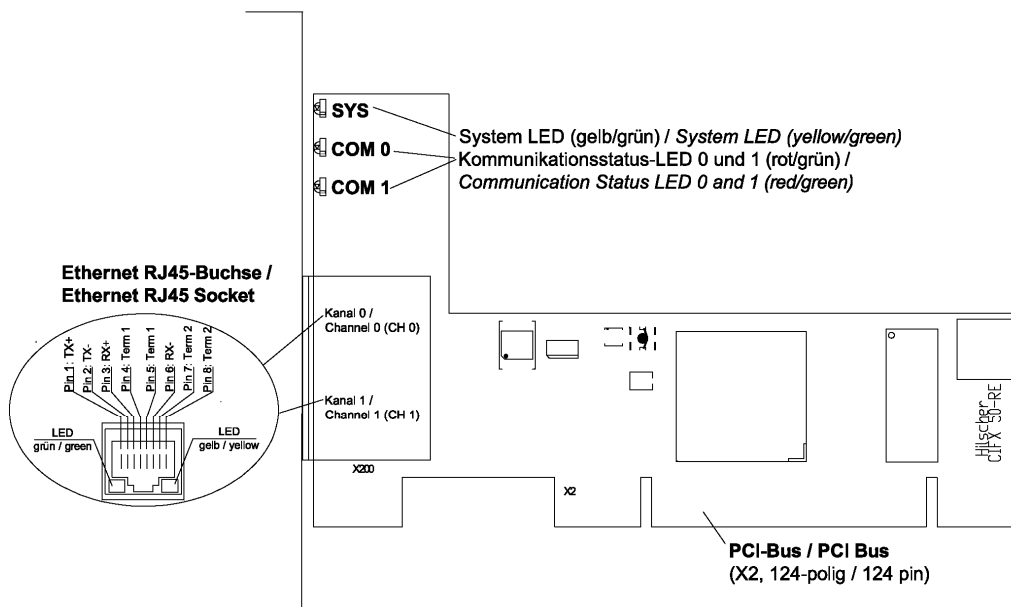


Figure 2: Device Drawing CIFX 50-RE (up to hardware revision 2)

The meaning of the LEDs depends from the loaded firmware. See chapter *LEDs* beginning from page 221.

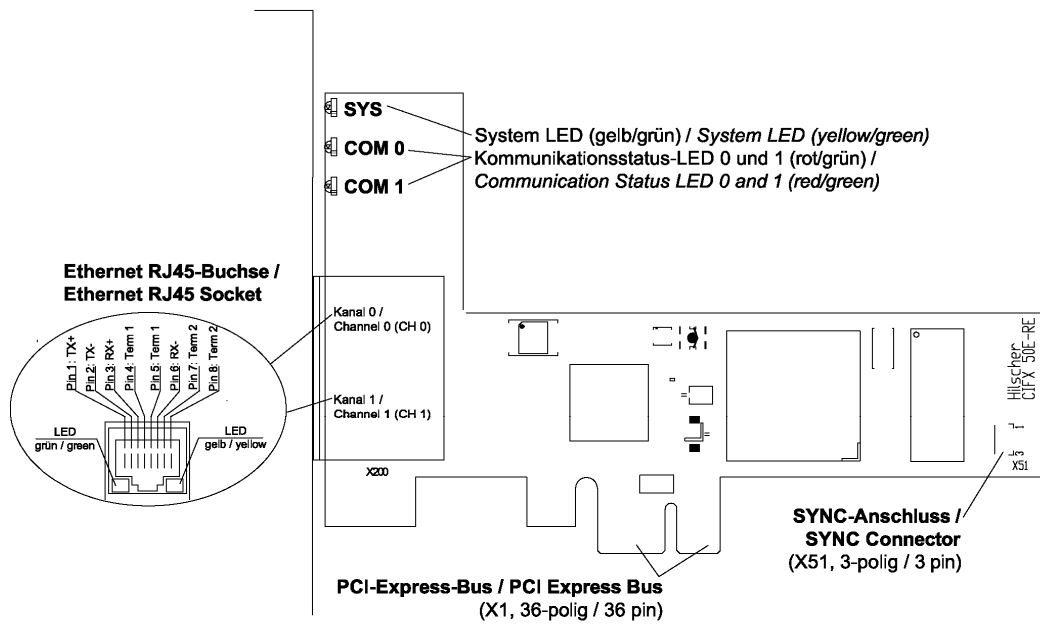
Note:

Device supports Auto Crossover Function

Note:

With loaded Open Modbus/TCP or EtherCAT Master firmware only channel 0 can be used, channel 1 is deactivated.

4.2 Device Drawing CIFX 50E-RE


Note:

Device supports Auto Crossover Function

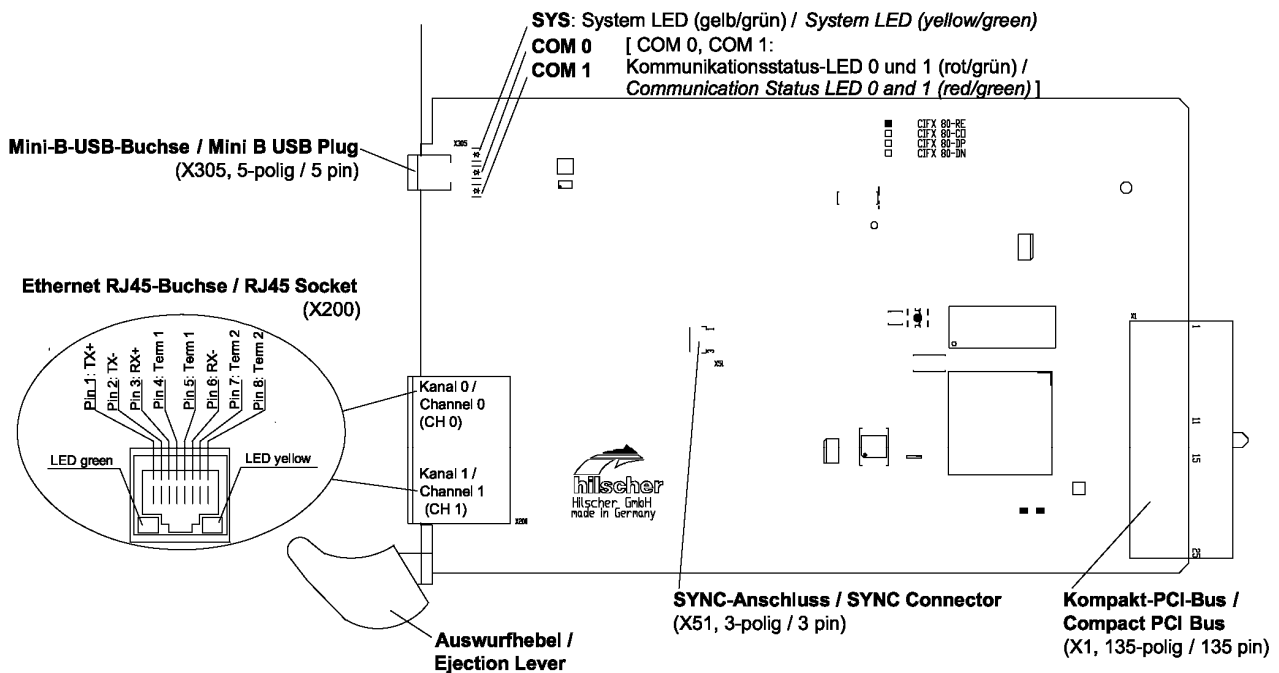
Note:

With loaded Open Modbus/TCP or EtherCAT Master firmware only channel 0 can be used, channel 1 is deactivated.

Figure 3: Device Drawing CIFX 50E-RE

The meaning of the LEDs depends from the loaded firmware. See chapter *LEDs* beginning from page 221. For the SYNC pinning refer to section *Pinning for SYNC Connector, X51* on page 65.

4.3 Device Drawing CIFX 80-RE



Note: Device supports Auto Crossover Function

Note: With loaded Open Modbus/TCP or EtherCAT Master firmware only channel 0 can be used, channel 1 is deactivated.

Figure 4: Device Drawing CIFX 80-RE

The meaning of the LEDs depends from the loaded firmware. See chapter *LEDs* beginning from page 221. For the SYNC pinning refer to section *Pinning for SYNC Connector, X51* on page 65.

4.4 Device Drawing CIFS 90-RE\F

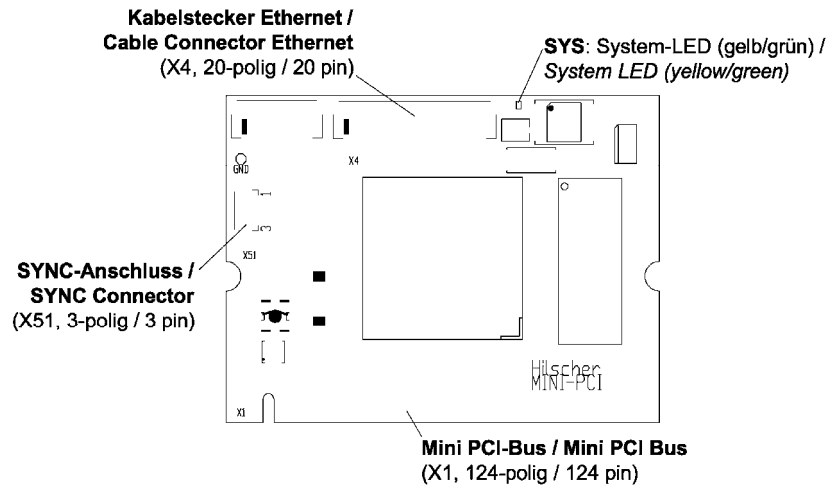


Figure 5: Device Drawing CIFS 90-RE\F

For the SYNC pinning refer to section *Pinning for SYNC Connector, X51* on page 65.

4.5 Device Drawing CIFS 90E-RE\F

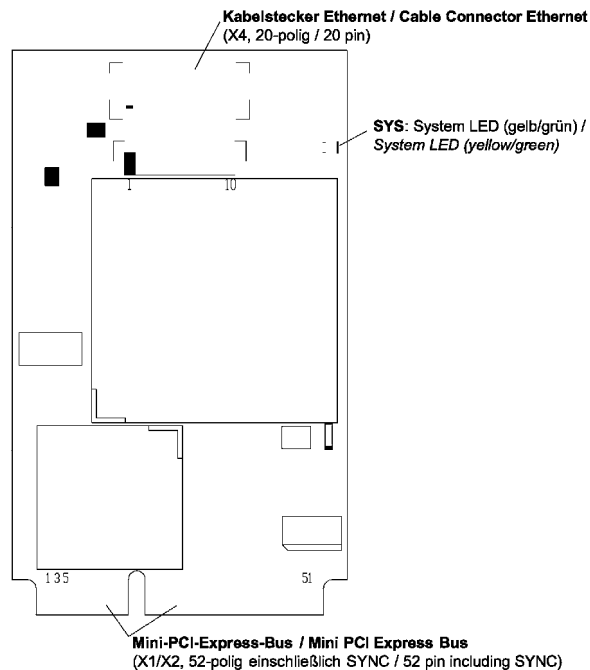
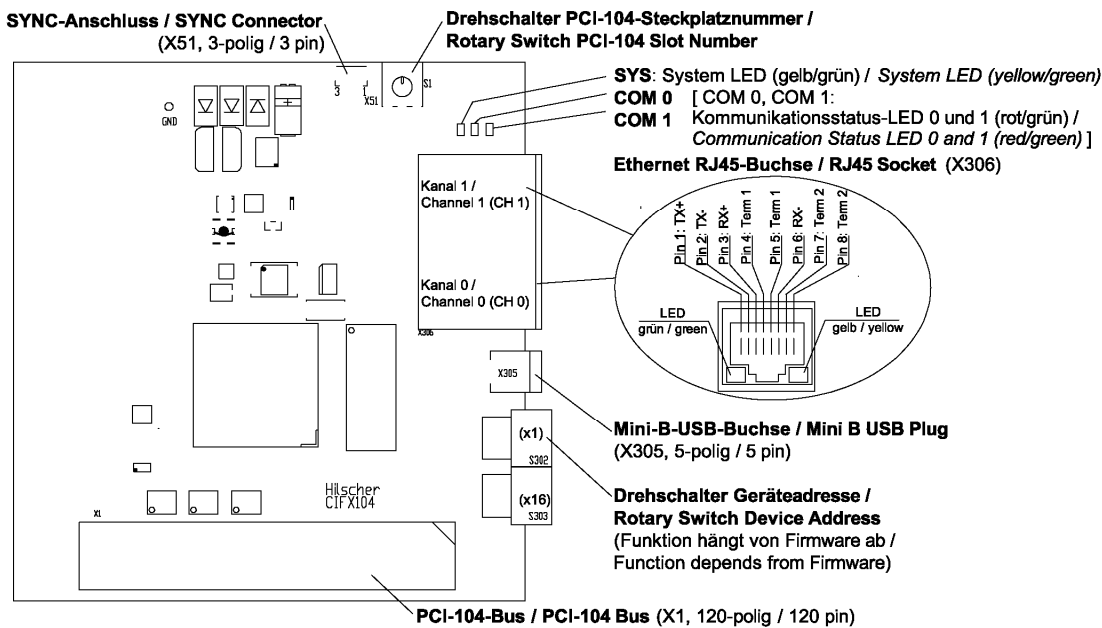


Figure 6: Device Drawing CIFS 90E-RE\F

For the SYNC pins refer to section *Pinning for Mini PCI Express Bus / SYNC Connector, X1/X2*, on page 66 or to section *Pinning for SYNC Connector, X51* on page 65.

4.6 Device Drawing CIFS 104C-RE



Note:

Device supports Auto Crossover Function

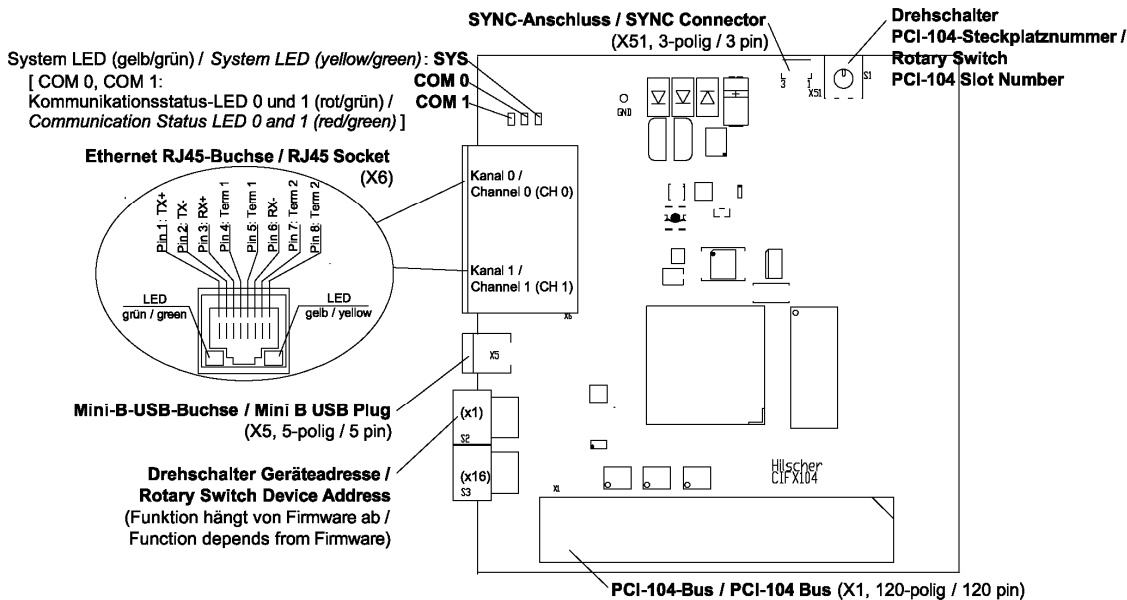
Note:

With loaded Open Modbus/TCP or EtherCAT Master firmware only channel 0 can be used, channel 1 is deactivated.

Figure 7: Device Drawing CIFS 104C-RE

The meaning of the LEDs depends from the loaded firmware. See chapter *LEDs* beginning from page 221. For the SYNC pinning refer to section *Pinning for SYNC Connector, X51* on page 65.

4.7 Device Drawing CIFS 104C-RE-R



Note:

Device supports Auto Crossover Function

Note

With loaded Open Modbus/TCP or EtherCAT Master firmware only channel 0 can be used, channel 1 is deactivated.

Figure 8: Device Drawing CIFS 104C-RE-R

The meaning of the LEDs depends from the loaded firmware. See chapter *LEDs* beginning from page 221. For the SYNC pinning refer to section *Pinning for SYNC Connector, X51* on page 65.

4.8 Device Drawing CIFS 104C-RE\F

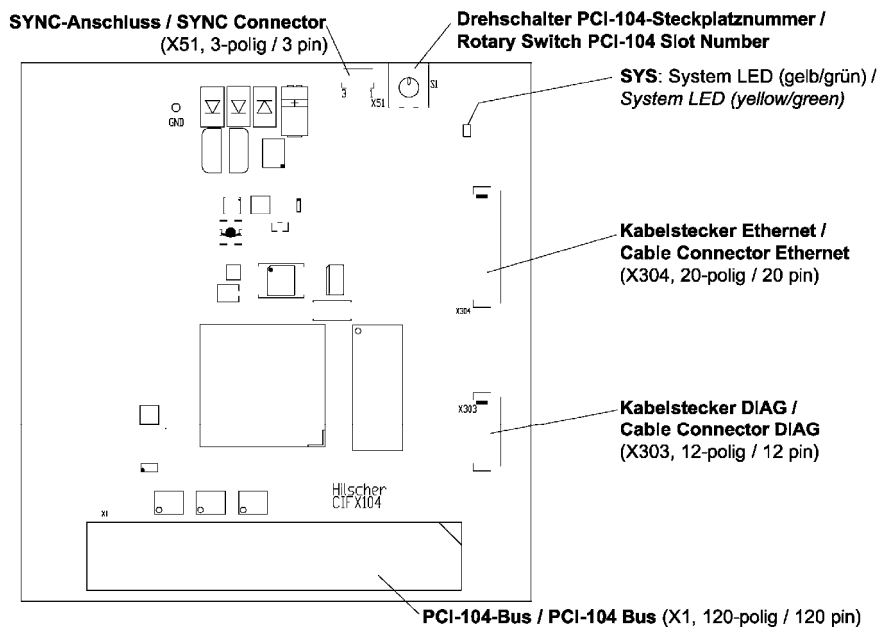


Figure 9: Device Drawing CIFS 104C-RE\F

For the SYNC pinning refer to section refer to section *Pinning for SYNC Connector*, X51 on page 65.

4.9 Device Drawing CIFS 104C-RE-R\F

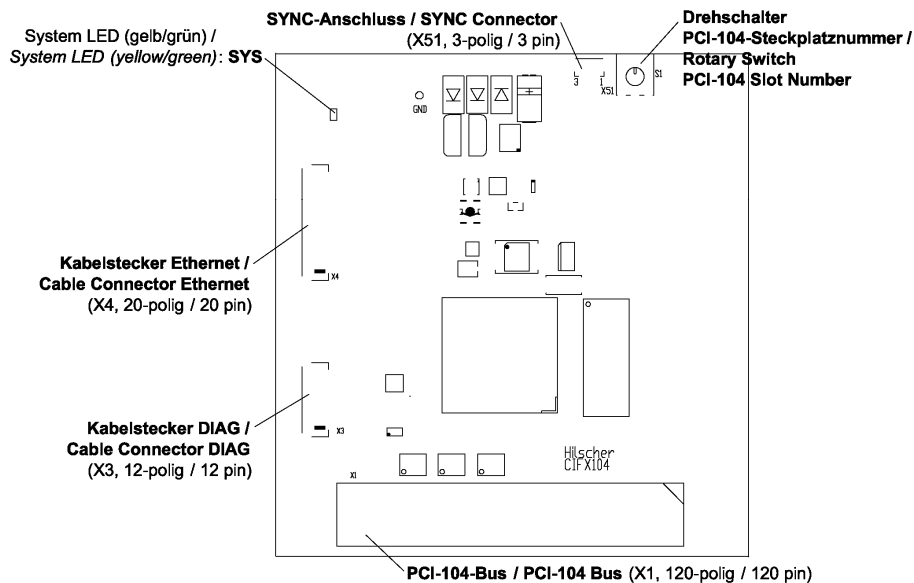


Figure 10: Device Drawing CIFS 104C-RE-R\F

For the SYNC pinning refer to section refer to section *Pinning for SYNC Connector*, X51 on page 65.

4.10 Device Drawing CIFS 104-RE

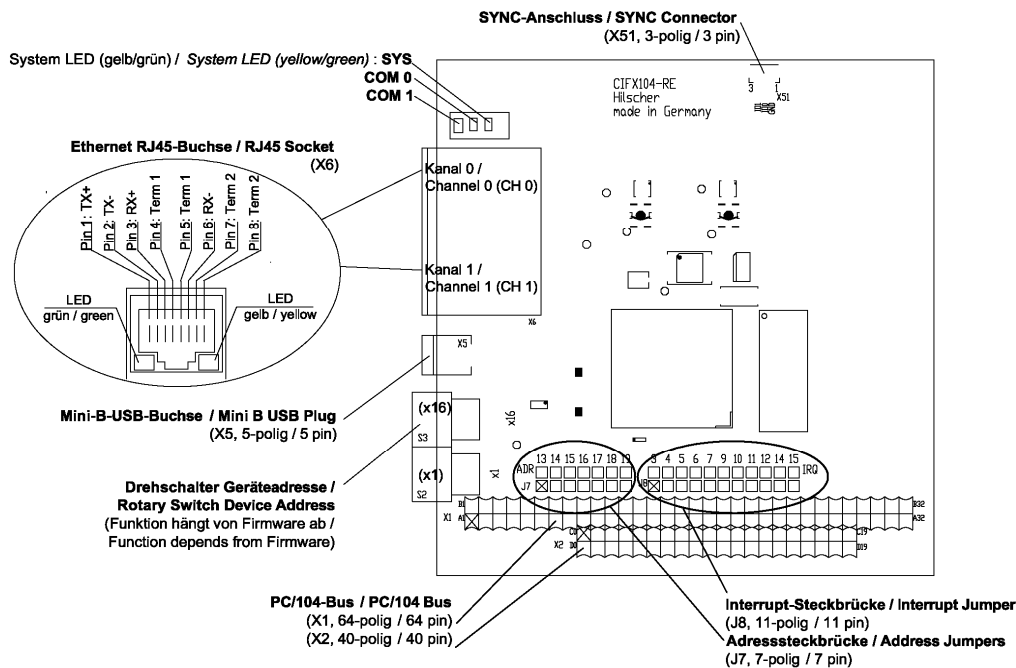


Figure 11: Device Drawing CIFS 104-RE

The meaning of the LEDs depends from the loaded firmware. See chapter *LEDs* beginning from page 221. For the SYNC pinning refer to section *Pinning for SYNC Connector, X51* on page 65.

4.11 Device Drawing CIFS 104-RE-R

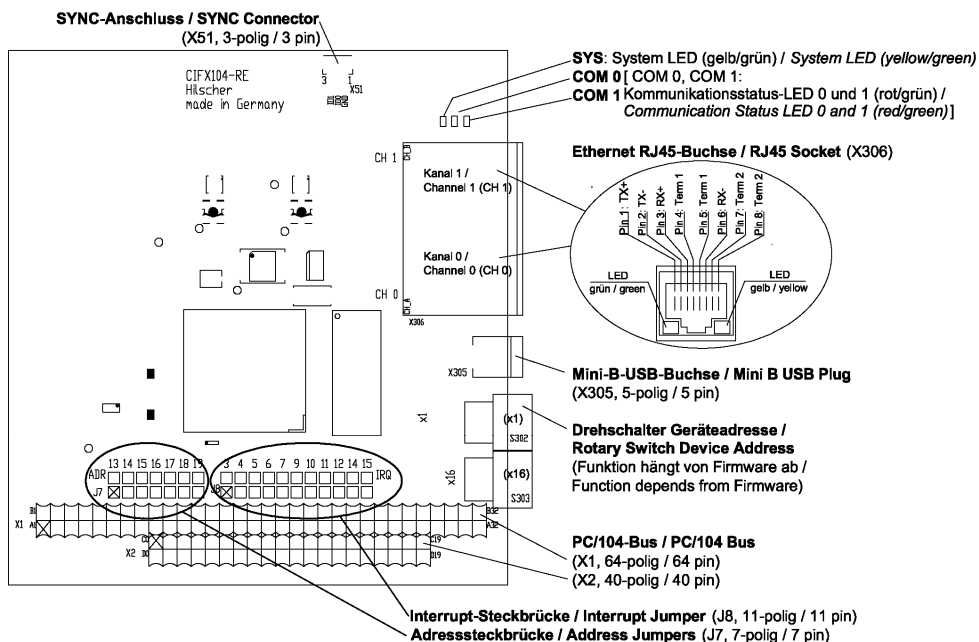


Figure 12: Device Drawing CIFS 104-RE-R

The meaning of the LEDs depends from the loaded firmware. See chapter *LEDs* beginning from page 221. For the SYNC pinning refer to section *Pinning for SYNC Connector, X51* on page 65.

Note:

Device supports Auto Crossover Function

Note:

With loaded Open Modbus/TCP or EtherCAT Master firmware only channel 0 can be used, channel 1 is deactivated.

Note:

Device supports Auto Crossover Function

Note

With loaded Open Modbus/TCP or EtherCAT Master firmware only channel 0 can be used, channel 1 is deactivated.

4.12 Device Drawing CIFS 104-RE\F

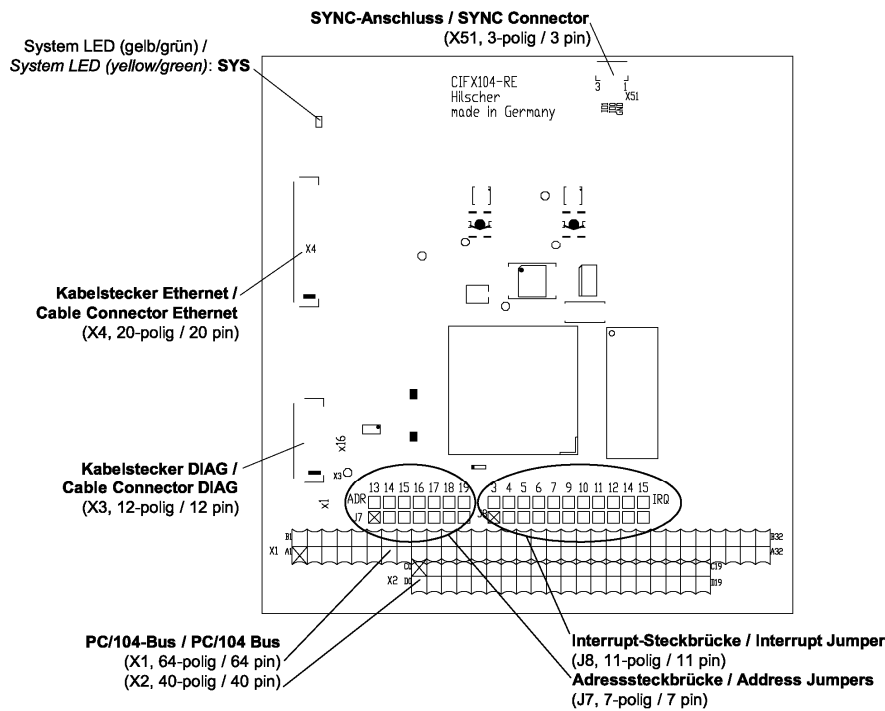


Figure 13: Device Drawing CIFS 104-RE\F

For the SYNC pinning refer to section *Pinning for SYNC Connector, X51* on page 65.

4.13 Device Drawing CIFS 104-RE-R\F

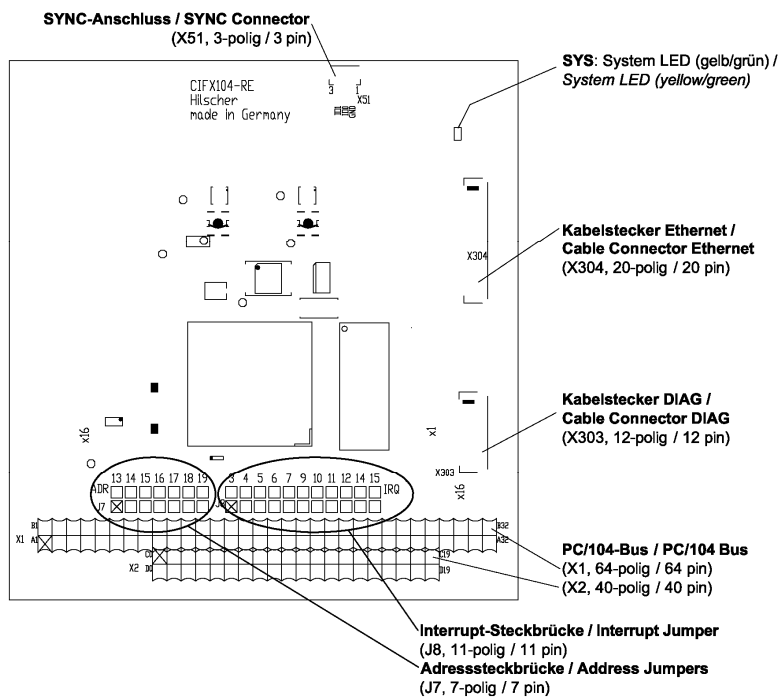


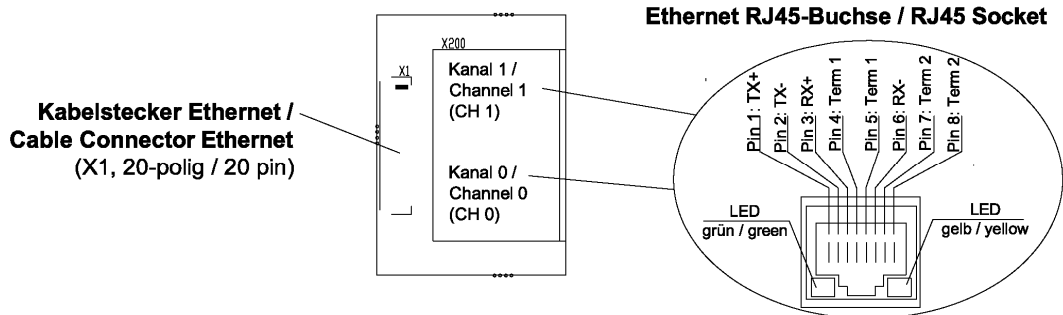
Figure 14: Device Drawing CIFS 104-RE-R\F

For the SYNC pinning refer to section *Pinning for SYNC Connector, X51* on page 65.

4.14 Device Drawing Assembly interface AIFX-RE

Only for:

CIFX 90-RE\F, CIFX 90E-RE\F,
CIFX 104C-RE\F, CIFX 104C-RE-R\F,
CIFX 104-RE\F, CIFX 104-RE-R\F



Note:

Device supports Auto Crossover Function

Note

With loaded Open Modbus/TCP or EtherCAT Master firmware only channel 0 can be used, channel 1 is deactivated.

Figure 15: Device Drawing Assembly interface AIFX-RE

The meaning of the LEDs depends from the loaded firmware. See chapter *LEDs* beginning from page 221.

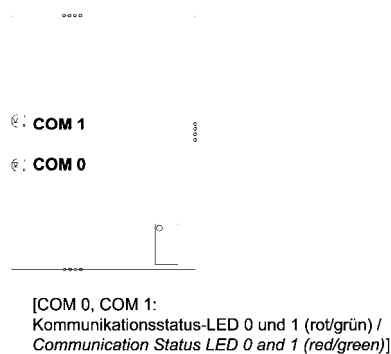


Figure 16: Device Drawing Assembly interface AIFX-RE (back side)

The meaning of the LEDs COM0 and COM1 corresponds to the description in chapter *LEDs* beginning from page 221.

4.14.1 AIFX-RE Dimensioning

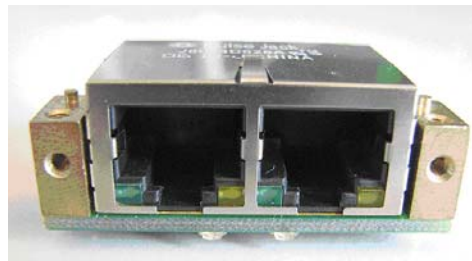
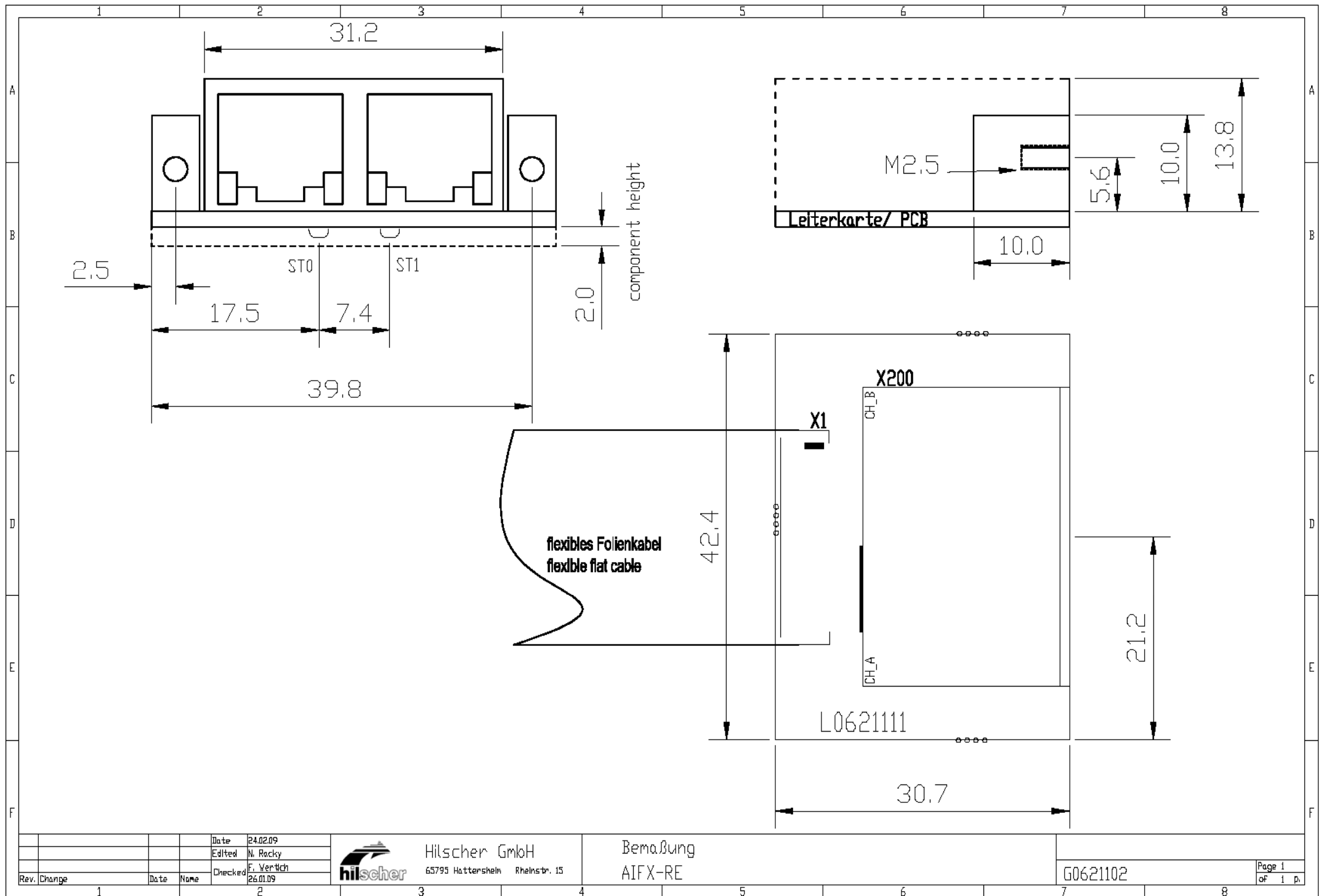


Figure 17: AIFX-RE (Front side)



Rev.	Change	Date	Name	Checked	Date	Name



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AIFX-RE

G0621102

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4.15 Device Drawing Diagnosis Interface AIFX-DIAG

Only for:

CIFX 104C-RE\F, CIFX 104C-RE-R\F ,
CIFX 104-RE\F, CIFX 104-RE-R\F

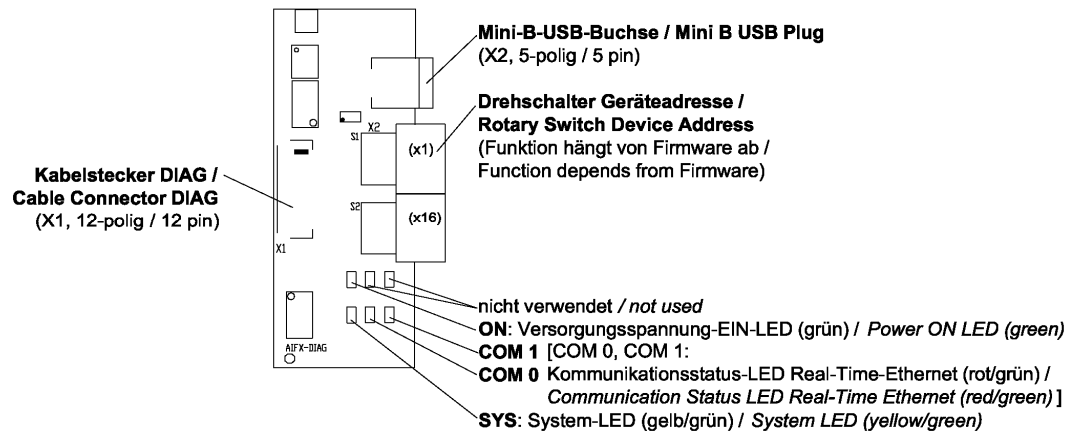


Figure 18: Device Drawing Diagnosis Interface AIFX-DIAG Real-Time Ethernet

The meaning of the LEDs COM0 and COM1 corresponds to the description in chapter *LEDs* beginning from page 221.

4.15.1 AIFX-DIAG Dimensioning

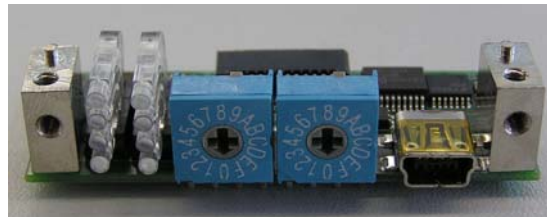
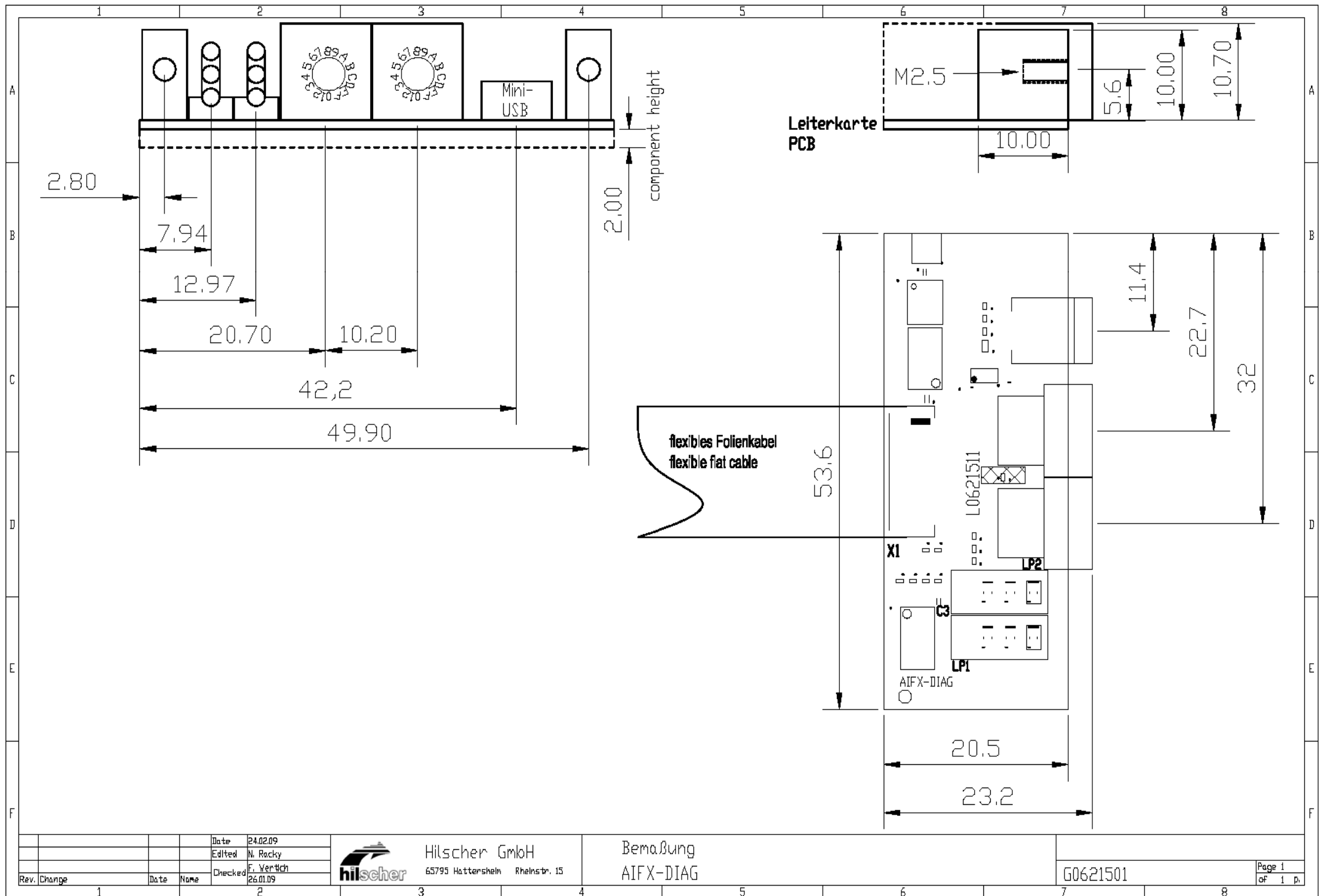


Figure 19: AIFX-DIAG (Front side)



Rev.	Change	Date	Name	Checked	Date	Name



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Bemaßung
AIFX-DIAG

G0621501

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4.16 Ethernet Interface

For the Ethernet interface use RJ45 plugs and twisted pair cable of category 5 (CAT5) or higher, which consists of 4 twisted cores and has a maximum transmission rate of 100 MBit/s (CAT5).

4.16.1 Ethernet pinning at the RJ45 Socket



Note: The device supports the Auto Crossover function. Due to this fact RX and TX can be switched. The following figure shows the RJ45 standard pinning.

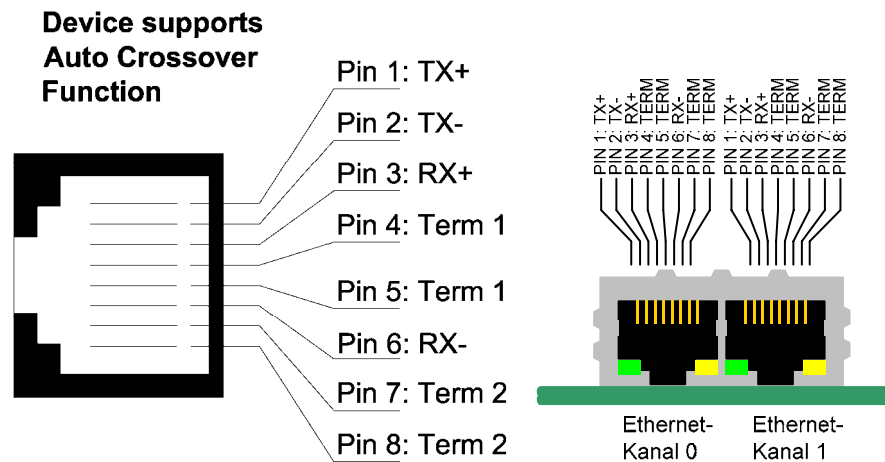


Figure 20: Ethernet pinning at the RJ45 Socket

Pin	Signal	Meaning
1	TX+	Transmit Data +
2	TX-	Transmit Data –
3	RX+	Receive Data +
4	Term 1	Connected to each other and terminated to PE through RC circuit*
5	Term 1	
6	RX-	Receive Data –
7	Term 2	Connected to each other and terminated to PE through RC circuit*
8	Term 2	
		* Bob Smith Termination

Table 28: Ethernet pinning at the RJ45 Socket



Note: The RJ45 socket is only for use in LAN, not for telecommunication circuits.

4.16.2 Ethernet Connection Data

Medium	2 x 2 Twisted-Pair cupric cable, CAT5 (100 MBit/s)
Length of cable	max. 100 m
Transmission rate	10 MBit/s/100 MBit/s

Table 29: Ethernet Connection Data

4.16.3 Use of Hubs and Switches

For the corresponding communication systems, the use of hubs and/or switches is either forbidden or allowed. The following table shows the acceptable use of hubs and switches by each communication system:

Communication System	Hub	Switch
EtherCAT	forbidden	only allowed between EtherCAT Master and first EtherCAT Slave (100 MBit/s, Full Duplex)
EtherNet/IP	allowed	allowed (10 MBit/s/100 MBit/s, Full or Half Duplex, Auto-Negotiation)
Open Modbus/TCP	allowed	allowed (10 MBit/s/100 MBit/s, Full or Half Duplex, Auto-Negotiation)
POWELINK	allowed	forbidden
PROFINET IO RT	forbidden	Only allowed, if the switch supports 'Priority Tagging' and LLDP (100 MBit/s, Full Duplex)
SERCOS III	forbidden	forbidden

Table 30: Use of Hubs and Switches



NOTICE!

Failure of the Network Communication

- Do not operate hardware with the communication controllers netX 50, netX100 or netX 500 with the protocols Ethernet TCP/UDP/IP, EtherNet/IP or Modbus TCP at 10 MBit/s in half-duplex mode, otherwise failure of the network communication can occur.
- Use only switches or 10/100 MBit/s dual-speed hubs and ensure that the network operates at 100 MBit/s and in full-duplex mode.

NOTICE

Failure of the Network Communication

- Do not operate hardware with the communication controllers netX 50, netX100 or netX 500 with the protocols Ethernet TCP/UDP/IP, EtherNet/IP or Modbus TCP at 10 MBit/s in half-duplex mode, otherwise failure of the network communication can occur.
- Use only switches or 10/100 MBit/s dual-speed hubs and ensure that the network operates at 100 MBit/s and in full-duplex mode.

For further information refer to section *Failure in 10 MBit/s Half Duplex Mode and Workaround* on page 220.

4.17 Mini-B USB Connector (5 Pin)

Only for:

CIFX 80-RE,
CIFX 104C-RE, CIFX 104C-RE-R,
CIFX 104-RE, CIFX 104-RE-R.

For:

CIFX 104C-RE\F, CIFX 104C-RE-R\F ,
CIFX 104-RE\F, CIFX 104-RE-R\F ,
when using the AIFX-DIAG.

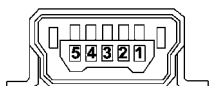


Figure 21: Mini-B USB Connector (5 Pin), S302

Pin	Name	Description
1	USB_EXT	USB Bus Power (+5 V, supplied externally)
2	D-	Data -
3	D+	Data +
4	ID	Not connected
5	GND	Ground

Table 31: Pin out, S302

4.18 Rotary Switch for PCI-104 Slot Number

Only for CIFX 104C cards.

The **Rotary Switch for PCI-104 Slot Number** is used for setting the physical PCI-104 Slot Number. At maximum four CIFX 104C cards can be plugged as modules one upon the other and each switch position must be used only once. The module plugged next to the host controller gets the CLK number 0, the following modules respectively get the next higher CLK number.

Switch Position	Module No. PCI-104 Slot	CLK No. (Clock)	ID-Select	INT
0, 4, 8	1	CLK 0	IDSEL 0	INTA
1, 5, 9	2	CLK 1	IDSEL 1	INTB
2, 6	3	CLK 2	IDSEL 2	INTC
3, 7	4	CLK 3	IDSEL 3	INTD

Table 32: Rotary Switch for PCI-104 Slot Number, S1

4.19 Rotary Switch for Slot Number (Card ID)

Only for:
CIFX 50-RE.

The **Rotary Switch Slot Number (Card ID)** serves to set the **Slot Number (Card ID)** of the cifX cards.

The **Slot Number (Card ID)** serves to distinguish cifX cards from each other clearly, especially if more cifX cards are installed into the very same PC.

The **cifX Device Driver** up to version **0.94x** identifies cifX cards via its device and serial number. For the device exchange service respectively a manual intervention is required.

The **cifX Device Driver** from version **0.950** on identifies cifX cards alternatively via its **Slot Number (Card ID)**.

Switch Position	Meaning
0	The value 0 means: - no Slot Number (Card ID), i. e. the Slot Number (Card ID) is not used, - for downwards compatibility purposes, - characterizes cifX cards not equipped with a Rotary Switch Slot Number (Card ID); i. e. these cifX cards are identified via its device and serial number.
1 ... 9	corresponds to the Slot Number (Card ID) 1 ... 9

Table 33: Rotary Switch for Slot Number (Card ID), S1

Application:

- To distinguish cifX cards from each other clearly, especially if more cifX cards are installed into the very same PC.
- In terms of a device exchange service (replacement case): If at the replacement cifX card installed in the PC the same **Slot Number (Card ID)** is set as at the preceding cifX card, then the same firmware and configuration is loaded into the replacement cifX card, as into the preceding cifX card.
- The application program can request and use the **Slot Number (Card ID)** from the **cifX Device Driver**.



For further information about the **Slot Number (Card ID)** refer to the sections:

- *References for Slot Number (Card ID)* (page 19),
- *The Function „Slot Number (Card ID)“* (page 38),
- *Requirements Slot Number (Card ID)* (page 45),
- *Setting Slot Number (Card ID)* (page 79),
- *Slot Number (Card ID) in the cifX Device Driver Setup* (page 143)
- *Slot Number (Card ID) in the Configuration Software* (page 146).

4.20 Cable Connector

4.20.1 Pinning for Cable Connector Ethernet

Only for:

CIFX 90-RE\F (X4) and CIFX 90E-RE\F (X4),
CIFX 104C-RE\F (X304), CIFX 104C-RE-R\F (X4),
CIFX 104-RE\F (X4), CIFX 104-RE-R\F (X304).

Pin	Signal
1	GND
2	+3V3 Analog
3	STA0_green (RE LED COM 0)
4	STA0_red (RE LED COM 0)
5	XM0_TX
6	STA1_green (RE LED COM 1)
7	CH0_LINKn
8	CH0_ACTIVITY
9	AIFINIT
10	STA1_red (RE LED COM 1)
11	CH0_TXP
12	CH0_TXN
13	CH0_RXP
14	CH0_RXN
15	CH1_TXP
16	CH1_TXN
17	CH1_RXP
18	CH1_RXN
19	CH1_LINKn
20	CH1_ACTIVITY

Table 34: Pinning for Cable Connector Ethernet X4 or X304 – Cable 20 pin Ethernet + Status LEDs

Cable Connector Ethernet:

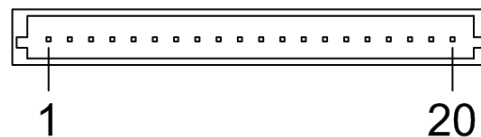


Figure 22: 1x20 Pins for CIFX 104C-RE\F, CIFX 104C-RE-R\F, CIFX 90-RE\F

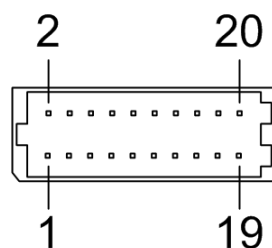


Figure 23: 2x20 Pins for CIFX 90E-RE\F

4.20.2 Pinning for Cable Connector DIAG

Only for:

CIFX 104C-RE\F (X303), CIFX 104C-RE-R\F (X3),
CIFX 104-RE\F (X3), CIFX 104-RE-R\F (X303).

Pin	Signal
1	GND
2	+3V3
3	STA2 (<i>not used</i>)
4	STA3 (<i>not used</i>)
5	USB_POS
6	USB_NEG
7	RDYn
8	RUNn
9	STA0_green (<i>RE LED COM 0</i>)
10	STA0_red (<i>RE LED COM 0</i>)
11	STA1_green (<i>RE LED COM 1</i>)
12	STA1_red (<i>RE LED COM 1</i>)

Table 35: Pinning for Cable connector DIAG X3 or X303 -
Cable 12 pin USB + Status LEDs

4.20.3 Pinning for SYNC Connector, X51

Only for:

CIFX 50-RE (since hardware Rev. 3), CIFX 50E-RE,
CIFX 80-RE, CIFX 90-RE\F,
CIFX 104C-RE, CIFX 104C-RE-R, CIFX 104C-RE\F, CIFX 104C-RE-R\F,
CIFX 104-RE, CIFX 104-RE-R, CIFX 104-RE\F, CIFX 104-RE-R\F.

Pin	Signal
1	GND
2	IO_SYNC0
3	IO_SYNC1

Table 36: Pinning for SYNC Connector, X51

CIFX 90E-RE\F: The SYNC pins are on the Mini PCI Express port (Pin 46, 44), refer to section *Pinning for Mini PCI Express Bus / SYNC Connector, X1/X2*, on page 66.

4.20.3.1 SYNC Connector, Items on Hardware

Item	Explanation
SYNC Signal:	3,3 V (LVTTTL), maximum load 6 mA
Connector	Female connector, 3 pin, RM 1.25 (for example, the type Molex series 51021) and female crimp contacts in design (e. g. type Molex series 50079 / 50058)
Max. Cable Length:	Recommendation: Max. 50 mm Note: Take EMC into consideration for the cable laying

Table 37: SYNC Connector: SYNC Signal, Connector, Max. Cable Length

4.20.3.2 SYNC Connector, Items on Firmware

The firmware determines the input signal or output signal. The following table shows the meaning of the SYNC signals for each protocol.

Protocol	Signal IO_SYNC0 Input/Output	Signal IO_SYNC1 Input/Output	From Firmware Version	Remarks
EtherCAT Slave	SYNC 0 Output	SYNC 1 Output	-	Configurable
SERCOS III Master	External trigger to start bus cycle Input Rising edge	-	2.0.8.0	-
SERCOS III Slave	CON_CLK Output	DIV_CLK Output	3.0.10.0	Configurable

Table 38: Meaning of the SYNC Signals for each Protocol

4.20.4 Pinning for Mini PCI Express Bus / SYNC Connector, X1/X2

Only for: CIFX 90E-RE\F (X1/X2)

The SYNC connection is realized via the mini PCI bus.

Pin (X1)	Signal	Pin (X2)	Signal
51	(not used)	52	+3.3V
49	(not used)	50	GND
47	(not used)	48	(not used)
45	(not used)	46	IO_SYNC0
43	(not used)	44	IO_SYNC1
41	(not used)	42	Bootloader
39	(not used)	40	GND
37	(not used)	38	USB_D+
35	GND	36	USB_D-
33	PERp0	34	GND
31	PERn0	32	(not used)
29	GND	30	(not used)
27	GND	28	(not used)
25	PETp0	26	GND
23	PETn0	24	(not used)
21	GND	22	PERST#
19	(not used)	20	(not used)
17	(not used)	18	GND
15	GND	16	(not used)
13	REFCLK+	14	(not used)
11	REFCLK-	12	(not used)
9	GND	10	(not used)
7	CLKREQ#	8	(not used)
5	(not used)	6	(not used)
3	(not used)	4	GND
1	(not used)	2	3.3V

Table 39: Pinning for Mini PCI Express Bus / SYNC Connector, X1/X2,
(valid from Hardware Revision 6 on)

Pin (X2)	Signal
48	+1.5V
28	+1.5V
24	+3.3Vaux
6	1.5V

Table 40: 1.5V Power Supply Pins 6,28,48 (+1V5) from 1.5V Plane (+1V5)
for the Pinning for Mini PCI Express Bus / SYNC Connector, X1/X2,
(valid for Hardware Revision 1 to 5)

For further information to the SYNC pins (Pin 46, 44) refer to section *Pinning for SYNC Connector, X51* on page 65.

4.21 Pinning for PC/104 Bus

Only for:

CIFX 104-RE, CIFX 104-RE-R ,
CIFX 104-RE\F, CIFX 104-RE-R\F

The used control signals of the PC/104 bus are given in the tables below.

Pin (X1)	A	B
1		GND
2	SD7	RESET
3	SD6	+5V
4	SD5	IRQ9
5	SD4	
6	SD3	
7	SD2	
8	SD1	
9	SD0	
10	IOCHRDY	GND
11	AEN	SMEMW
12	SA19	SMEMR
13	SA18	
14	SA17	
15	SA16	
16	SA15	
17	SA14	
18	SA13	
19	SA12	
20	SA11	
21	SA10	IRQ7
22	SA9	IRQ6
23	SA8	IRQ5
24	SA7	IRQ4
25	SA6	IRQ3
26	SA5	
27	SA4	
28	SA3	
29	SA2	+5V
30	SA1	
31	SA0	GND
32	GND	GND

Table 41: Pinning for PC/104-Bus, X1
(Control Signals used on the 8 Bit Connector)

Pin (X2)	B	C
0	GND	GND
1	SBHE	GND
2		
3		IRQ10
4		IRQ11
5		IRQ12
6		IRQ15
7		IRQ14
8		
9		
10		
11	SD9	
12	SD10	
13	SD11	
14	SD12	
15	SD13	
16	SD14	+5V
17	SD15	
18	SD16	GND
19		GND

Table 42: Pinning for PC/104-Bus, X2
(Used Control Signals on the Expansion Connector)

5 Getting Started

5.1 Steps how to install and configure cifX Card Real-Time Ethernet (Slave)

The following table describes the steps on how to install and to configure a cifX card Real-Time Ethernet (Slave) as it is typical for many cases. The cifX card (Slave) can be configured using the **netX Configuration Tool**. In many cases also the corresponding DTM in the configuration software **SYCON.net** can be used.



Note: If the hardware gets installed at the PC before the cifX Device Driver Installation has been done, the Windows® Found New Hardware Wizard is started and the operating system Windows® asks for the driver. This is the mode, if **the hardware is installed first and only then the driver**.

#	Step	Description	For detailed information see section	Page
1	Installing the Hardware	Installing cifX card Real-Time Ethernet (Slave): Set the Slot Number (Card ID) : (Value 0 or a value from 1 to 9) Device revisions equipped with a Rotary Switch Slot Number (Card ID) are listed separately in section <i>Hardware: cifX Cards Real-Time Ethernet</i> on page 17 in <i>Table 2</i> . Set physical PCI-104 Slot Number (only for PCI-104 Devices). Set Starting Address and Interrupt (only for PC/104 Devices). Note:	<i>Installing cifX Card</i> <i>Setting Slot Number (Card ID)</i> <i>CIFX 104C-RE and CIFX 104C-RE-R, CIFX 104C-RE\F and CIFX 104C-RE-R\F</i> <i>For PC/104 Devices: Set Starting Address and Interrupt</i>	76 79 87, 88 91
		 ⚠ DANGER Lethal Electrical Shock caused by parts with more than 50V! Disconnect the power plug of the PC or of the connecting device. Make sure, that the power supply is off at the PC or at the connecting device.	<i>Electrical Shock Hazard</i>	30
		Now open the cabinet of the PC or of the connecting device. Plug in and mount the cifX card Real-Time Ethernet (Slave). If necessary, glue enclosed sticker on the front plate. If necessary, connect an AIFX assembly or a AIFX diagnosis interface. Close the cabinet of the PC or connecting device.	<i>Installing cifX Card</i>	76

For more see next page

#	Step	Description	For detailed information see section	Page
1	Installing the Hardware (continued)	 Important! When using Ethernet TCP/UDP/IP, EtherNet/IP or Modbus TCP at 10 MBit/s use only switches or 10/100 MBit/s dual-speed hubs and ensure that the network operates at 100 MBit/s and in full-duplex mode.	<i>Failure in 10 MBit/s Half Duplex Mode and Workaround</i>	220
		 Note! The RJ45 socket is only for use in LAN, not for telecommunication circuits.	<i>Ethernet Interface</i>	59
		Plug in the connecting cable to the cifX card Real-Time Ethernet (Master). Connect the PC or the connecting device to the power supply and switch it on.	<i>Installing cifX Card</i>	76
2	Installing cifX Device Driver	Windows® recognizes a new hardware and requires the device driver, which is on the CIFX DVD. Enter the CIFX DVD in the PC and follow to the instructions of the installation wizard, to install the driver.	<i>Installing cifX Device Driver</i>	103
3	DMA Mode in the cifX Device Driver Setup	Activate the DMA Mode in the cifX Device Driver Setup.	<i>Activating DMA Mode in the cifX Device Driver Setup</i>	145
4	Installing netX Configuration Tool	Start the netX Configuration Tool setup program to install the netX Configuration Tool .	<i>Installing the netX Configuration Tool</i>	134
5	Configuration Steps cifX Card	In the netX Configuration Tool : - Select the language, - Select and download the firmware, - Set and download the cifX card Real-Time Ethernet (Slave) parameters. Possibly use the corresponding DTM in the configuration software SYCON.net .	<i>Configuration Steps cifX Card</i>	147
			<i>Configuring Slave Devices using netX Configuration Tool</i>	165
			See corresponding user manual under <i>Documentations cifX Cards</i>	23

Table 43: Installation and Configuration Steps cifX Card Real-Time Ethernet (Slave)

5.1.1 Notes for the Configuration of the Master Device

To configure the Master, an device description file is required. Please note the following notes for the configuration of the Master Device:

Real-Time Ethernet System	Note
<i>EtherCAT Slave</i>	To configure the Master, an XML file (device description file) is required. The settings in the used Master must comply with the settings in the Slave to establish communication. Important parameters are: Vendor ID, Product Code, Serial Number, Revision Number, Output and Input Data Bytes.
	If the XML file <i>Hilscher cifX RE ECS V2.2.x.xml</i> is use/updated, the firmware with the version 2.2.x must be use/updated.
	The loadable firmware supports for the number of cyclic input data and for cyclic output data in total up to 400 bytes. If more than 200 bytes for input data or for output data should be exchanged via EtherCAT, then a customer specific XML file is necessary. Additionally the following formular applies: $(\text{number of input bytes} + 3)/4 + (\text{number of output bytes} + 3)/4$ must be less or equal to 100.
<i>EtherNet/IP-Adapter</i>	To configure the Scanner/Master, an EDS file (device description file) is required. The settings in the used Scanner/Master must comply with the settings in the Adapter/Slave to establish communication. Important parameters are: Input, Output Data Bytes, Vendor ID, Product Type, Product Code, Major Rev, Minor Rev, IP Address and Netmask.
<i>Powerlink-Controlled-Node/Slave</i>	To configure the Managing Node/Master, an XDD file (device description file) is required. The settings in the used Managing Node/Master must comply with the settings in the Controlled Node/Slave, to establish communication. Important parameters are: Vendor ID, Product Code, Serial Number, Revision Number, Node ID, Output and Input length.
<i>PROFINET IO-Device</i>	To configure the Controller, a GSDML file (device description file) is required. The settings in the used Controller must comply with the settings in the Device to establish communication. Important parameters are: Station Name, Vendor ID, Device ID, Input and Output Data Bytes. Under Name of Station , the name must be typed which was also used in the configuration file of the master of this device. If no name chosen freely is used in the configuration file, then the name from the GSDML file is used.
<i>SERCOS III Slave</i>	To configure the Master, an XML file (device description file) is required. The settings in the used Master must comply with the settings in the Slave to establish communication.

Table 44: Notes for the Configuration of the Master Device



Further information to the device description files you find under section on *Device Description Files* page 21.

5.2 Steps how to install and configure cifX Card Real-Time Ethernet (Master)

The following table describes the steps to configure a cifX card Real-Time Ethernet (Master) as it is typical for many cases.

#	Step	Description	For detailed information see section	Page
1	Installing the Hardware	Installing cifX card Real-Time Ethernet (Master): Set the Slot Number (Card ID) : (Value 0 or a value from 1 to 9) Device revisions equipped with a Rotary Switch Slot Number (Card ID) are listed separately in section <i>Hardware: cifX Cards Real-Time Ethernet</i> on page 17 in <i>Table 2</i> . Set physical PCI-104 Slot Number (only for PCI-104 Devices). Set Starting Address and Interrupt (only for PC/104 Devices). Note:	<i>Installing cifX Card</i>	76
			<i>Setting Slot Number (Card ID)</i>	79
			<i>CIFX 104C-RE and CIFX 104C-RE-R, CIFX 104C-RE\F and CIFX 104C-RE-R\F</i>	87, 88
			<i>For PC/104 Devices: Set Starting Address and Interrupt</i>	91
		 ⚠ DANGER Lethal Electrical Shock caused by parts with more than 50V! Disconnect the power plug of the PC or of the connecting device. Make sure, that the power supply is off at the PC or at the connecting device.	<i>Electrical Shock Hazard</i>	30
		Now open the cabinet of the PC or of the connecting device. If necessary, glue enclosed sticker on the front plate. Plug in and mount the cifX card Real-Time Ethernet (Master). If necessary, connect an AIFX assembly or a AIFX diagnosis interface. Close the cabinet of the PC or connecting device.	<i>Installing cifX Card</i>	76
		 Important! When using Ethernet TCP/UDP/IP, EtherNet/IP or Modbus TCP at 10 MBit/s use only switches or 10/100 MBit/s dual-speed hubs and ensure that the network operates at 100 MBit/s and in full-duplex mode.	<i>Failure in 10 MBit/s Half Duplex Mode and Workaround</i>	220
		 Note! The RJ45 socket is only for use in LAN, not for telecommunication circuits.	<i>Ethernet Interface</i>	59
		Plug in the connecting cable to the cifX card Real-Time Ethernet (Slave) Connect the PC or the connecting device to the power supply and switch it on.	<i>Installing cifX Card</i>	76

For more see next page

#	Step	Description	For detailed information see section	Page
2	Installing cifX Device Driver	Windows® recognizes a new hardware and requires the device driver, which is on the CIFX DVD. Enter the CIFX DVD in the PC and follow to the instructions of the installation wizard, to install the driver.	<i>Installing cifX Device Driver</i>	103
3	DMA Mode in the cifX Device Driver Setup	Activate the DMA Mode in the cifX Device Driver Setup.	<i>Activating DMA Mode in the cifX Device Driver Setup</i>	145
4	Installing SYCON.net	Run the SYCON.net-Setup and follow to the instructions of the installation wizard.	<i>Installing SYCON.net</i>	135
5	Firmware Download	- Start configuration software SYCON.net, - Create new project /Open existing project, - Insert Master or Slave into configuration, - Select driver and assign device. - Select and download the firmware.	See corresponding user manual under <i>Documentations cifX Cards</i>	23
6	Configuration cifX card Real-Time Ethernet (Master)	-Configure the cifX card Real-Time Ethernet (Master).	<i>Device Names in SYCONnet</i>	74
7	Download Configuration	- Download the configuration to the cifX card Real-Time Ethernet (Master) *. (*PROFIBUS-DP Master, CANopen Master, DeviceNet Master)		
8	Diagnostic	- Rightclick on device symbol. - Select context menu entry Diagnosis, - then select Diagnosis > Station Diagnosis or Master Diagnosis.		
9	I/O Monitor	- Rightclick on device symbol. - Select context menu entry Diagnosis, - then Additional Tools > IO Monitor. - Check the input or output data.		

Table 45: Installation and Configuration Steps cifX Card Real-Time Ethernet (Master)

5.3 Device Names in SYCONnet

The following table contains the device names displayed for the single communication protocols in the configuration software SYCONnet.

The table shows the card type and which protocol can be used with this card type. Furthermore, the table shows, for which protocol which device must be selected from the device catalog to configure the cifX card with SYCON.net.

Card-Type	Protocol	DTM Specific Group	Device Name in SYCON.net
CIFX 50-RE CIFX 50E-RE CIFX 80-RE CIFX 90-RE\F CIFX 90E-RE\F CIFX 104C-RE CIFX 104C-RE-R CIFX 104C-RE\F CIFX 104C-RE-R\F CIFX 104-RE CIFX 104-RE-R CIFX 104-RE\F CIFX 104-RE-R\F	EtherCAT Master	Master	CIFX RE/ECM
	EtherCAT Slave	Gateway/ Stand-Alone Slave	CIFX RE/ECS
	EtherNet/IP Scanner (Master)	Master	CIFX RE/EIM
	EtherNet/IP Adapter (Slave)	Gateway/ Stand-Alone Slave	CIFX RE/EIS
	Open Modbus/TCP	Gateway/ Stand-Alone Slave	CIFX RE/OMB
	Powerlink Controlled Node/Slave	Gateway/ Stand-Alone Slave	CIFX RE/PLS
	PROFINET IO-RT-Controller	Master	CIFX RE/PNM
	PROFINET IO-RT-Device	Gateway/ Stand-Alone Slave	CIFX RE/PNS
	SERCOS III Master	Master	CIFX RE/S3M
	SERCOS III Slave	Gateway/ Stand-Alone Slave	CIFX RE/S3S

Table 46: Device Names in SYCON.net by Communication Protocol

5.4 Update for Firmware, Driver and Software



Note: As a prerequisite for the software update the project files, the configuration files and firmware files are to be saved.

At existing hardware installation the firmware, the driver and the configuration software must be updated according to the versions given in section *Reference on Hardware, Firmware, Software and Driver* on page 17. The following graphic gives an overview:

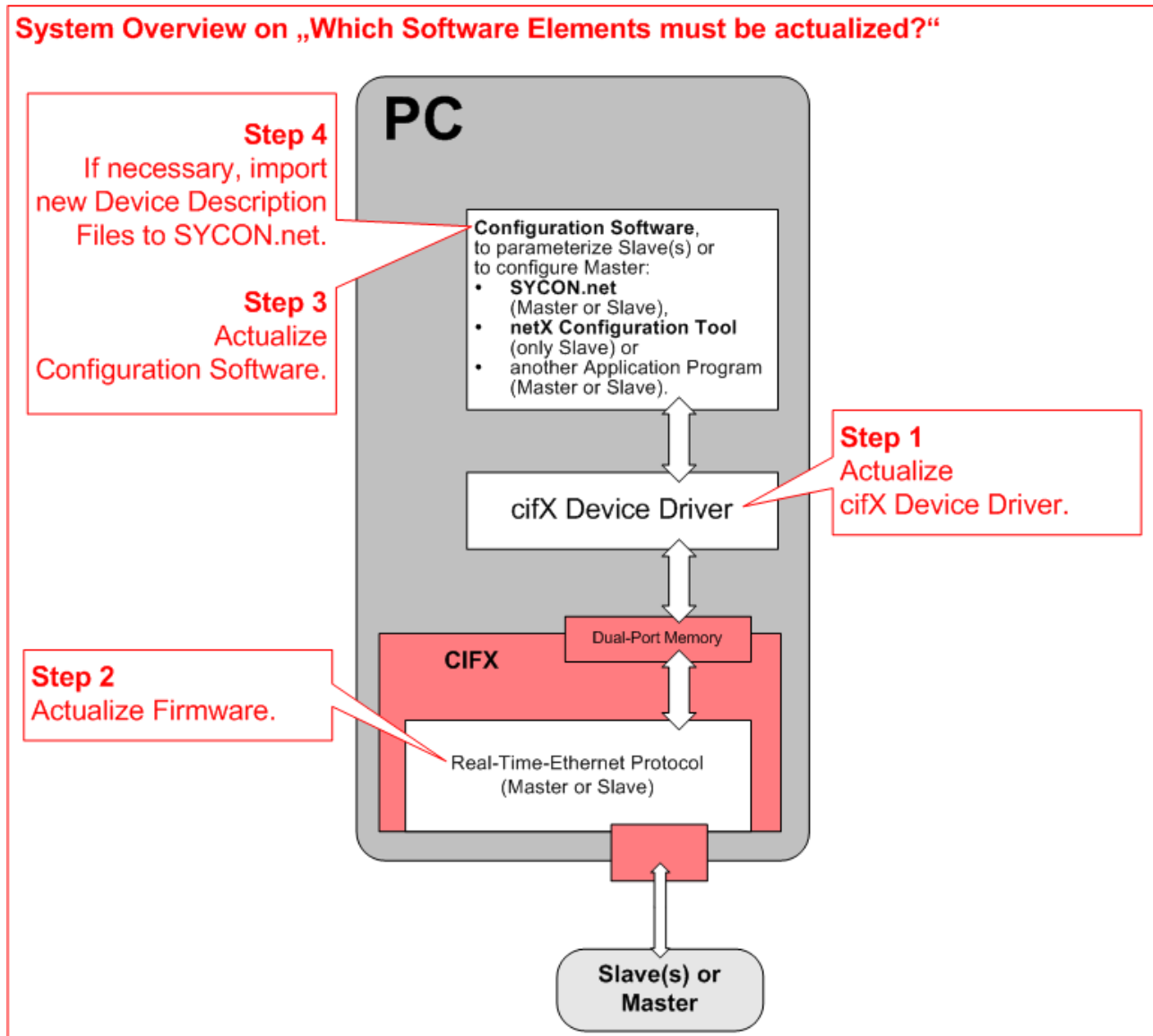


Figure 24: System Overview cifX to update Firmware, Driver and Software



Note the specific details for devices with **ISA bus** in section *Reference on Firmware* on page 18, for devices with **Rotary Switch Slot Number (Card ID)** in the section *Requirements Slot Number (Card ID)* on page 45 or **DMA Mode** in section *Requirements DMA Mode* on page 46.

6 Installing cifX Card



For the card installation check any hints in the overview in chapter *Getting Started* on page 69.

6.1 Safety Instructions

Obey to the following safety advices, when installing the cifX card.

6.1.1 Electrical Shock Hazard



DANGER!



Lethal Electrical Shock caused by parts with more than 50V!

- HAZARDOUS VOLTAGE inside of the PC or of the connecting device.
- Therefore first disconnect the power plug of the PC or of the connecting device.
- Make sure, that the power supply is off at the PC or at the connecting device.
- Open the PC cabinet and install or remove the cifX card only after disconnecting power.

USA:



⚠ DANGER

Lethal Electrical Shock caused by parts with more than 50V!



- HAZARDOUS VOLTAGE inside of the PC or of the connecting device.
- Therefore first disconnect the power plug of the PC or of the connecting device.
- Make sure, that the power supply is off at the PC or at the connecting device.
- Open the PC cabinet and install or remove the cifX card only after disconnecting power.

6.2 Property Damage Messages

Obey to the following property damage messages, when installing the cifX card.

6.2.1 Device Destruction by exceeding allowed Supply Voltage

For all CIFX 50, CIFX 50E, CIFX 80, CIFX 90 and CIFX 90E devices you must follow this instruction:



NOTICE

Device Destruction!

- Use only 3.3 V for supply voltage to operate the card.
Operation with 5 V supply voltage leads to device destruction.
-

USA:



NOTICE

Device Destruction!

- Use only 3.3 V for supply voltage to operate the card.
Operation with 5 V supply voltage leads to device destruction.
-

6.2.2 Device Destruction by exceeding allowed Signaling Voltage

Adhere for all cifX cards described in this manual the instruction hereafter:



NOTICE

Device Destruction!

- All I/O signal pins at the cifX card tolerate only a specified signaling voltage!
 - Operation with a signaling voltage other than the specified signaling voltage may lead to severe damage to the cifX card!
-

For detailed information on the supply and signaling voltage of the cifX cards described in this manual, refer to section *Supply and Signal Voltage* on page 42.

USA:



NOTICE

Device Destruction!

- All I/O signal pins at the cifX card tolerate only a specified signaling voltage!
 - Operation with a signaling voltage other than the specified signaling voltage may lead to severe damage to the cifX card!
-

6.2.3 Electrostatically sensitive Devices

Adhere to the necessary safety precautions for components that are vulnerable with electrostatic discharge.



NOTICE

Electrostatically sensitive Devices

- To prevent damage to the PC and the cifX, make sure, that the cifX card is grounded via the endplate and the PC and make sure, that you are discharged when you mount/demount the cifX card.
-

USA:



NOTICE

Electrostatically sensitive Devices

- To prevent damage to the PC and the cifX, make sure, that the cifX card is grounded via the endplate and the PC and make sure, that you are discharged when you mount/demount the cifX card.
-

6.3 Setting Slot Number (Card ID)

The **Slot Number (Card ID)** must be set at the cifX card using the **Rotary Switch Slot Number (Card ID)**.

Device revisions equipped with a **Rotary Switch Slot Number (Card ID)** are listed separately in section *Hardware: cifX Cards Real-Time Ethernet* on page 17 in *Table 2*.

Setting **Slot Number (Card ID)**:

- Set the value 0 or a value from 1 to 9.

Switch Position	Meaning
0	The value 0 means: ▪ no Slot Number (Card ID), i. e. the Slot Number (Card ID) is not used, ▪ for downwards compatibility purposes, ▪ characterizes cifX cards not equipped with a Rotary Switch Slot Number (Card ID); i. e. these cifX cards are identified via its device and serial number.
1 ... 9	corresponds to the Slot Number (Card ID) 1 ... 9

Table 47: Rotary Switch for Slot Number (Card ID)



For further information about the **Slot Number (Card ID)** refer to the sections:

- *References for Slot Number (Card ID)* (page 19),
- *The Function „Slot Number (Card ID)“* (page 38),
- *Requirements Slot Number (Card ID)* (page 45),
- *Rotary Switch for Slot Number (Card ID)* (page 62),
- *Slot Number (Card ID) in the cifX Device Driver Setup* (page 143)
- *Slot Number (Card ID) in the Configuration Software* (page 146).

6.3.1 Front Plate CIFX 50-RE

The figure below shows the front plate of the CIFX 50-RE card. From hardware revision 5 on, the **Rotary Switch Slot Number (Card ID)** is provided.

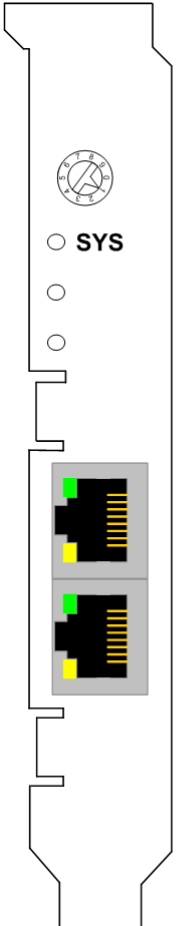
Front Plate X 50-RE	Meaning
	
①	Rotary Switch Slot Number (Card ID) The figure shows the rotary switch in position 1.
②	LED SYS
③	LED COM0 (Designation and meaning depends by protocol)
④	LED COM1 (Designation and meaning depends by protocol)
⑤	Ethernet Interface (Channel 0)
⑥	Ethernet Interface (Channel 1)

Table 48: Front Plate CIFX 50-RE

6.4 CIFX 50-RE and CIFX 50E-RE

For installation of the CIFX 50-RE or CIFX 50E-RE card handle as follows:

1. Use the sticker according to the firmware and glue it on the front of the CIFX 50-RE or CIFX 50E-RE card (see section *Fix Front Plate Sticker* on page 82).
2. For devices with **Rotary Switch Slot Number (Card ID)** set the **Slot Number (Card ID)**: (Value 0 or a value from 1 to 9), (see section *Setting Slot Number (Card ID)* on page 79). Device revisions equipped with a **Rotary Switch Slot Number (Card ID)** are listed separately in section *Hardware: cifX Cards Real-Time Ethernet* in Table 2 on page 17.



⚠ DANGER

Lethal Electrical Shock caused by parts with more than 50V!

- Disconnect the power plug of the PC or of the connecting device.
- Make sure, that the power supply is off at the PC or at the connecting device.

3. Open the cabinet of the PC or of the connecting device.
4. Plug in the CIFX 50-RE card on a free PCI slot, or plug in the CIFX 50E-RE card on a free PCI express slot.
5. Fix the CIFX 50-RE or CIFX 50E-RE card using the hole intended.
6. Close the cabinet of the PC or connecting device.
7. Connect the PC or the connecting device to the power supply and switch it on.

6.4.1 Fix Front Plate Sticker



Note: Your cifX card set contains a set of front plate stickers (6 different stickers). Depending from the loaded firmware the label on each sticker indicates the names of the respective system and communication status LEDs or of the LEDs of the RJ45 Ethernet female connector. (Further information to this question you find also in chapter *LEDs* beginning from page 221.)

Front Plate Stickers for CIFX 50-RE and CIFX 50E-RE:

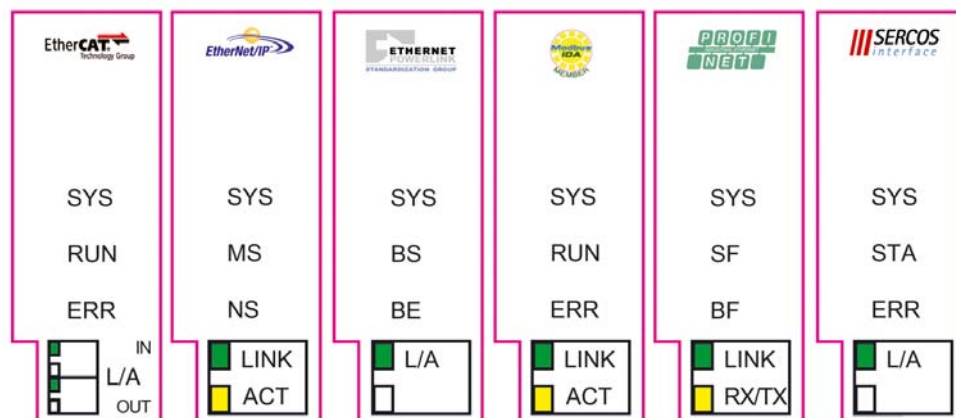


Figure 25: Front Plate Stickers for CIFX 50-RE and CIFX 50E-RE for the labeling of the card LEDs or of the LEDs of the Ethernet female connector

LED		EtherCAT Master	EtherCAT Slave	EtherNet/IP	Powerlink	Open Modbus/TCP	PROFINET IO	SERCOS III
SYS (yellow/green)		SYS	SYS	SYS	SYS	SYS	SYS	SYS
COM 0 (red/ green)		RUN	RUN	MS	BS	RUN	SF	STA
COM 2 (red/ green)		ERR	ERR	NS	BE	ERR	BF	ERR
RJ45 Ch0	green	LINK	L/A IN	LINK	L/A	LINK	LINK	L/A
	yellow	ACT	-	ACT	-	ACT	RX/TX	-
RJ45 Ch1	green	-	L/A OUT	LINK	L/A	LINK	LINK	L/A
	yellow	-	-	ACT	-	ACT	RX/TX	-

Table 49: LED Labeling depending of the loaded Firmware

- Use the sticker according to the firmware and glue it on the front of the CIFX 50-RE or CIFX 50E-RE card.

6.5 CIFX 80-RE

For installation of the CIFX 80-RE card handle as follows:

1. Use the sticker according to the firmware and glue it on the front of the CIFX 80-RE card (see section *Fix Front Plate Sticker* on page 84).



⚠ DANGER

Lethal Electrical Shock caused by parts with more than 50V!

- Disconnect the power plug of the PC or of the connecting device.
 - Make sure, that the power supply is off at the PC or at the connecting device.
-
2. Open the cabinet of the PC or of the connecting device.
 3. Possibly remove a blank plate.
 4. Put down the ejection lever at the CIFX 80-RE card.
 5. Plug in the CIFX 80-RE card to a free compact PCI slot.
 6. Fasten the CIFX 80-RE card.
 - Tip up the lever and click in.
 - Screw the CIFX 80-RE card with two screws onto the wholes above and below.
 7. Close the cabinet of the PC or connecting device.
 8. Connect the PC or the connecting device to the power supply and switch it on.

Note: To remove the CIFX 80-RE card from the compact PCI slot, first press the grey button at the ejection lever and then press the ejection lever downwards.

6.5.1 Fix Front Plate Sticker



Note: Your cifX card set contains a set of front plate stickers (6 different stickers). Depending from the loaded firmware the label on each sticker indicates the names of the respective system and communication status LEDs or of the LEDs of the RJ45 Ethernet female connector. (Further information to this question you find also in chapter *LEDs* beginning from page 221.)

LED		EtherCAT Master	EtherCAT Slave	EtherNet/IP	Powerlink	Open Modbus/TCP	PROFINET IO	SERCOS III
SYS (yellow/green)		SYS	SYS	SYS	SYS	SYS	SYS	SYS
COM 0 (red/ green)		RUN	RUN	MS	BS	RUN	SF	STA
COM 1 (red/ green)		ERR	ERR	NS	BE	ERR	BF	ERR
RJ45 Ch0	green	LINK	L/A IN	LINK	L/A	LINK	LINK	L/A
	yellow	ACT	-	ACT	-	ACT	RX/TX	-
RJ45 Ch1	green	-	L/A OUT	LINK	L/A	LINK	LINK	L/A
	yellow	-	-	ACT	-	ACT	RX/TX	-

Table 50: LED Labeling depending of the loaded Firmware

- Use the sticker according to the firmware and glue it on the front of the CIFX 80-RE card.

6.6 CIFX 90-RE\F and CIFX 90E-RE\F

For installation of the CIFX 90-RE\F or of the CIFX 90E-RE\F card handle as follows:



⚠ DANGER

Lethal Electrical Shock caused by parts with more than 50V!

- Disconnect the power plug of the PC or of the connecting device.
- Make sure, that the power supply is off at the PC or at the connecting device.

1. Open the cabinet of the PC or of the connecting device.

CIFX 90-RE\F card:

2. Plug in the CIFX 90-RE\F card in the Mini PCI socket on the mainboard.
3. Press the clamps at the Mini PCI socket until they snap in, to fasten the CIFX 90-RE\F card to the mainboard.

Or

CIFX 90E-RE\F card:



Note: As the CIFX 90E-RE\F-card can be inserted correctly into the mini-PCI Express card slot, the element height in the Mini-PCI Express card slot of the connecting device must meet to the standard guidelines.

4. Plug in the CIFX 90E-RE\F card in the PCI Express Mini Card System Connector on the mainboard.
5. Press down the card until it snaps into place.

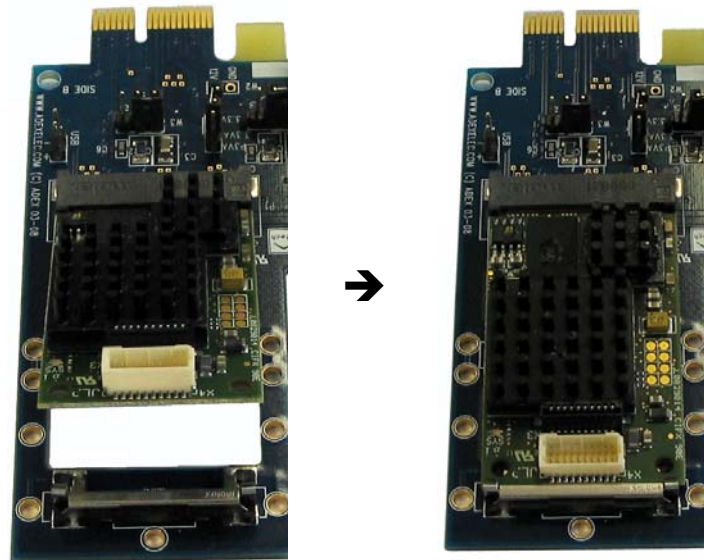


Figure 26: Plug in the CIFX 90E-RE\F card in the PCI Express Mini Card System Connector on the mainboard and press down the card until it snaps into place.

Connecting the AIFX-RE

To connect the AIFX-RE assembly interface:

6. Connect the cable connector Ethernet X1 on the AIFX-RE assembly interface with the cable.

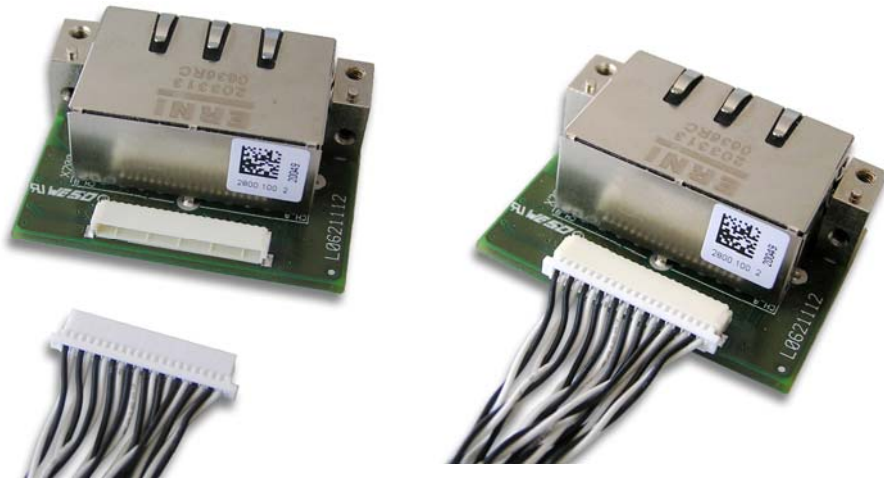


Figure 27: Connect the cable connector Ethernet X1 on the AIFX-RE assembly interface with the cable.

7. Connect the cable connector Ethernet X4 on the CIFX 90-RE\F or on the CIFX 90E-RE\F card with the cable.

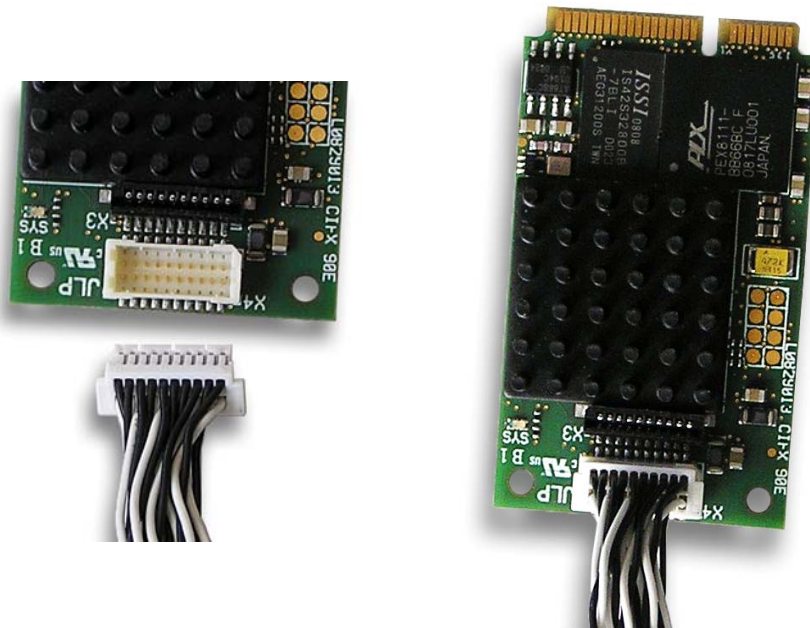


Figure 28: Connect the cable connector Ethernet X4 on the CIFX 90E-RE\F card* with the cable. (*Example in this figure)

8. Mount the AIFX-RE at the PC housing panel.
- Only then:
9. Close the cabinet of the PC or connecting device.
10. Connect the PC or the connecting device to the power supply and switch it on.

6.7 CIFX 104C-RE and CIFX 104C-RE-R

For installation of the CIFX 104C-RE card handle as follows:



⚠ DANGER

Lethal Electrical Shock caused by parts with more than 50V!

- Disconnect the power plug of the PC or of the connecting device.
- Make sure, that the power supply is off at the PC or at the connecting device.

1. Set the physical PCI-104 Slot Number for each CIFX 104C-RE card using the **Rotary Switch for PCI-104 Slot Number** on the card.



Note: At maximum four CIFX 104C cards can be plugged as modules one upon the other and each switch position must be used only once. The module plugged next to the host controller gets the CLK number 0, the following modules respectively get the next higher CLK number. For further information refer to section *Rotary Switch for PCI-104 Slot Number* on page 61.

2. Open the cabinet of the PC or of the connecting device.
3. Plug in the CIFX 104C-RE card on a free PCI-104 slot.
4. Fix the CIFX 104C-RE card to the mainboard using 4 spacing bolts and screws intended. The scope of delivery does not include spacing bolts and screws.
5. Close the cabinet of the PC or connecting device.
6. Connect the PC or the connecting device to the power supply and switch it on.

6.8 CIFS 104C-RE\F and CIFS 104C-RE-R\F

For installation of the CIFS 104C-RE\F card handle as follows:



⚠ DANGER

Lethal Electrical Shock caused by parts with more than 50V!

- Disconnect the power plug of the PC or of the connecting device.
- Make sure, that the power supply is off at the PC or at the connecting device.

1. Set the physical PCI-104 Slot Number for each CIFS 104C-RE card using the **Rotary Switch for PCI-104 Slot Number** on the card.



Note: At maximum four CIFS 104C cards can be plugged as modules one upon the other and each switch position must be used only once. The module plugged next to the host controller gets the CLK number 0, the following modules respectively get the next higher CLK number. For further information refer to section *Rotary Switch for PCI-104 Slot Number* on page 61.

2. Open the cabinet of the PC or of the connecting device.
3. Plug in the CIFS 104C-RE\F card on a free PCI-104 slot.
4. Fix the CIFS 104C-RE\F card to the mainboard using 4 spacing bolts and screws intended. The scope of delivery does not include spacing bolts and screws.

Connecting the AIFX-RE

To connect the assembly interface AIFX-RE:

5. Connect the cable connector Ethernet X1 on the assembly interface AIFX-RE with the cable.

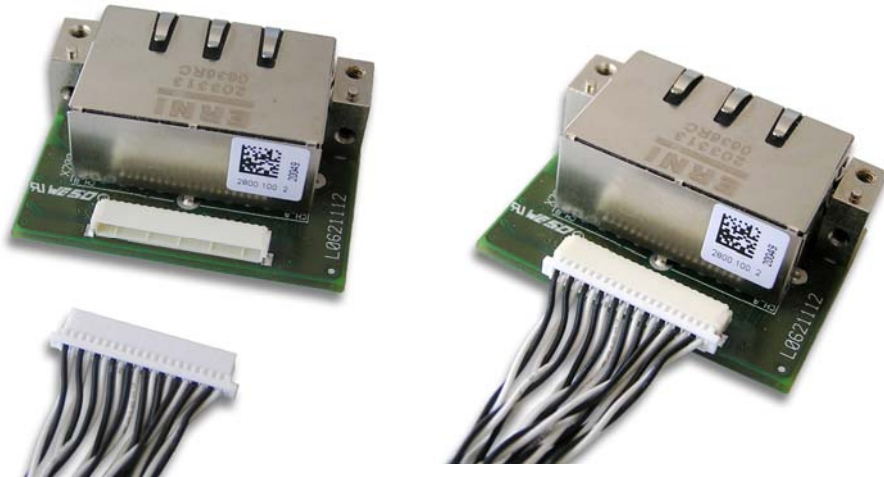


Figure 29: Connect the cable connector Ethernet X1 on the AIFX-RE assembly interface with the cable.

6. Connect the cable connector Ethernet X4 (or X304) on the CIFX 104C-RE\F card with the cable.

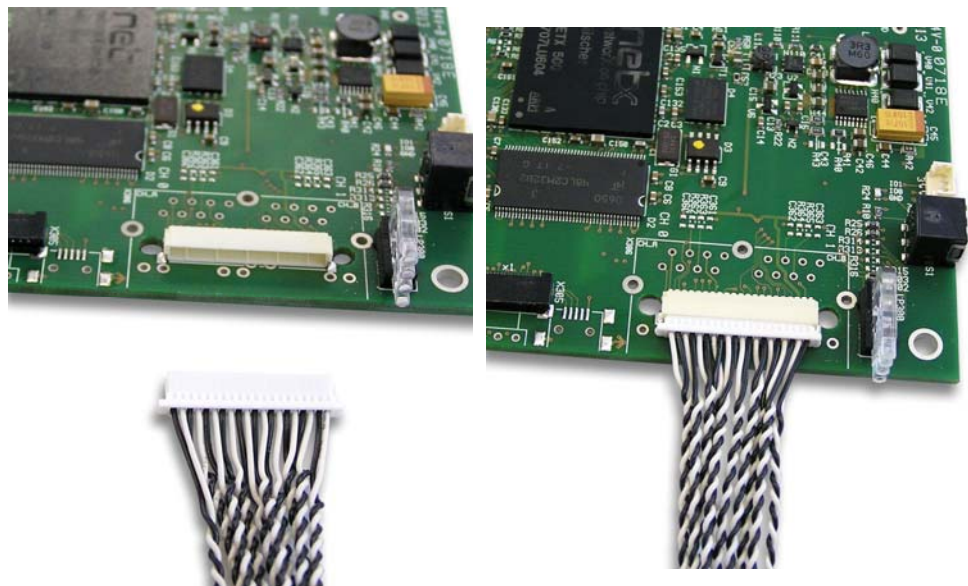


Figure 30: Connect the cable connector Ethernet X304 on the CIFX 104C-RE\F card* with the cable. (*Example in this figure)

7. Mount the AIFX-RE on the front plate of the cifX card.

Connecting the AIFX-DIAG

To connect the diagnosis interface AIFX-DIAG:

8. Connect the cable connector DIAG X1 on the diagnosis interface AIFX-DIAG with the cable.



Important! The contacts on the connection cable must face up!.

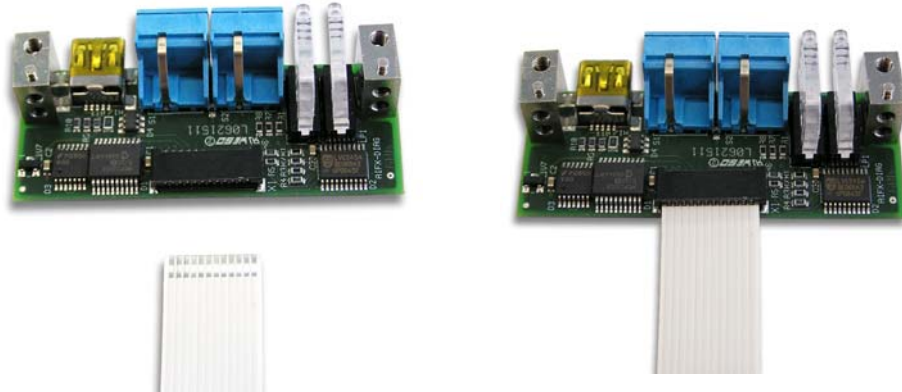


Figure 31: Connect the cable connector DIAG X1 on the AIFX-DIAG assembly interface with the cable.

9. Connect the cable connector DIAG X3 (or X303) on the CIFX 104C-REF card with the cable.



Important! The contacts on the connection cable must face up!.

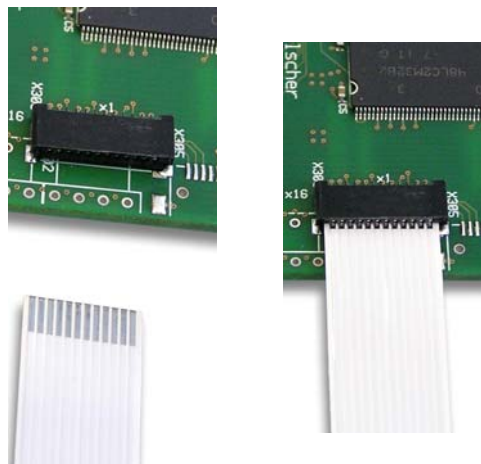


Figure 32: Connect the cable connector DIAG X303 on the CIFX 104C-REF card* with the cable. (*Example in this figure)

10. Mount the AIFX-DIAG on the front plate of the cifX card.

After that:

11. Close the cabinet of the PC or connecting device.
12. Connect the PC or the connecting device to the power supply and switch it on.

6.9 For PC/104 Devices: Set Starting Address and Interrupt

To set the starting address and or an interrupt for PC/104 cards, proceed as follows:



Important! Make sure that the configured memory areas and interrupts are not used by another PC component.

1. In order to identify and prevent such errors:

➤ Start the **Device Manager**.

➤ Select **menu View > Resources by type**.

➤ The used **Memory** respectively the **interrupt (IRQ) resources** are shown.

➤ Search for a free memory area:

The possible memory area is between C0000 and F8000 (hex):

The card can be used in poll mode or in interrupt mode.

➤ If the cards should be used in interrupt mode, then search for a free interrupt:

Possible interrupts are 3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15

2. Configure the start address of the cifX PC/104 device.



Note: Please note that the PC/104 device requires a free memory area of 16 KByte between 0xC0000 und 0xFBFFF is necessary.

Address	A19	A18	A17	A16	A15	A14
C0000			X	X	X	X
C4000			X	X	X	
C8000			X	X		X
CC000			X	X		
D0000			X		X	X
D4000			X		X	
D8000			X			X
DC000			X			
E0000				X	X	X
E4000				X	X	
E8000				X		X
EC000				X		
F0000					X	X
F4000					X	
F8000						X

Interrupt	3	...	12	14	15
15					X
14				X	
12			X		
...					
3	X				

Table 51: Addressing of an PC/104 Card with 16 KByte Dual-Port Memory
(X = Jumper closed)

3. If you are using the interrupt mode, set up a free interrupt on the PC/104 device.

For polling operation mode interrupt jumpers are not required.



Note: The default setting is address D0000 and no interrupt (**Basis Configuration 0**). To change the address select **Basis Configuration 1**. The interrupt and the address can be changed under **Basis Configuration 2**.



Note: On some PCs it is not possible to find a free ISA memory area between C0000–FF000 or a free ISA interrupt in the Device Manager. This is Windows 2000®/Windows® XP ACPI (Advanced Configuration and Power Management Interface) depending. Please check at first if your PC is ACPI compatible and you are using the latest BIOS version for your mainboard. Are there still problems to find available ISA resources, you can try to run Windows® 2000/Windows® XP in "Standard PC" mode (ACPI disabled). Therefore the ACPI-HAL of Windows® 2000/Windows® XP must be replaced with the STANDARD-PC-HAL or Windows® 2000/Windows® XP must be installed new. Please contact Microsoft how to change the Windows® 2000/Windows® XP-HAL, because this can make your installation unusable.

6.10 CIFX 104-RE and CIFX 104-RE-R (PC/104)

For installation of the CIFX 104-RE card handle as follows:

1. If you are using the interrupt mode, set up a free interrupt on the PC/104 device.

For polling operation mode interrupt jumpers are not required.



⚠ DANGER

Lethal Electrical Shock caused by parts with more than 50V!

- Disconnect the power plug of the PC or of the connecting device.
- Make sure, that the power supply is off at the PC or at the connecting device.

2. Open the cabinet of the PC or of the connecting device.
3. Plug in the CIFX 104-RE card on a free PC/104 slot.
4. Fix the CIFX 104-RE card to the mainboard using 4 spacing bolts and screws intended. The scope of delivery does not include spacing bolts and screws.
5. Close the cabinet of the PC or connecting device.
6. Connect the PC or the connecting device to the power supply and switch it on.

6.11 CIFX 104-RE\F and CIFX 104-RE-R\F (PC/104)

For installation of the CIFX 104-RE\F card handle as follows:

1. If you are using the interrupt mode, set up a free interrupt on the PC/104 device.

For polling operation mode interrupt jumpers are not required.



⚠ DANGER

Lethal Electrical Shock caused by parts with more than 50V!

- Disconnect the power plug of the PC or of the connecting device.
- Make sure, that the power supply is off at the PC or at the connecting device.

2. Open the cabinet of the PC or of the connecting device.
3. Plug in the CIFX 104-RE\F card on a free PC/104 slot.
4. Fix the CIFX 104-RE\F card to the mainboard using 4 spacing bolts and screws intended. The scope of delivery does not include spacing bolts and screws.

Connecting the AIFX-RE

To connect the assembly interface AIFX-RE:

5. Connect the cable connector Ethernet X1 on the assembly interface AIFX-RE with the cable.

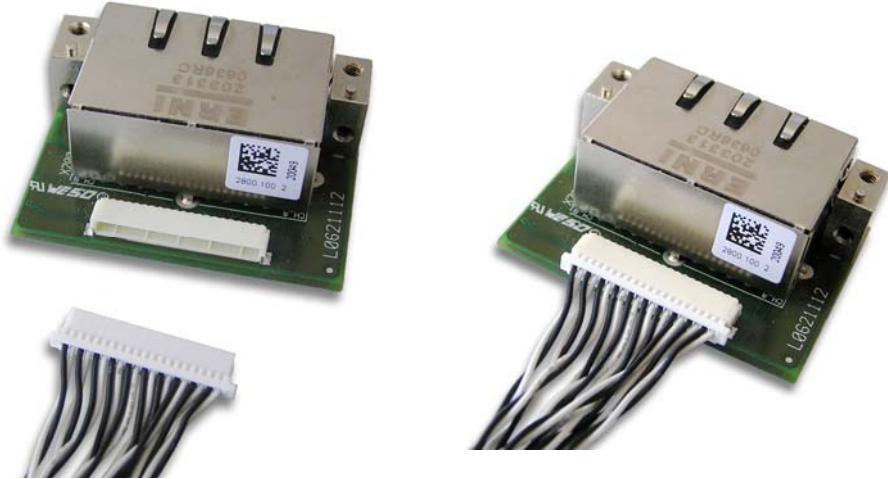


Figure 33: Connect the cable connector Ethernet X1 on the AIFX-RE assembly interface with the cable.

7. Connect the cable connector Ethernet X4 (or X304) on the CIFX 104-RE\RF card with the cable.

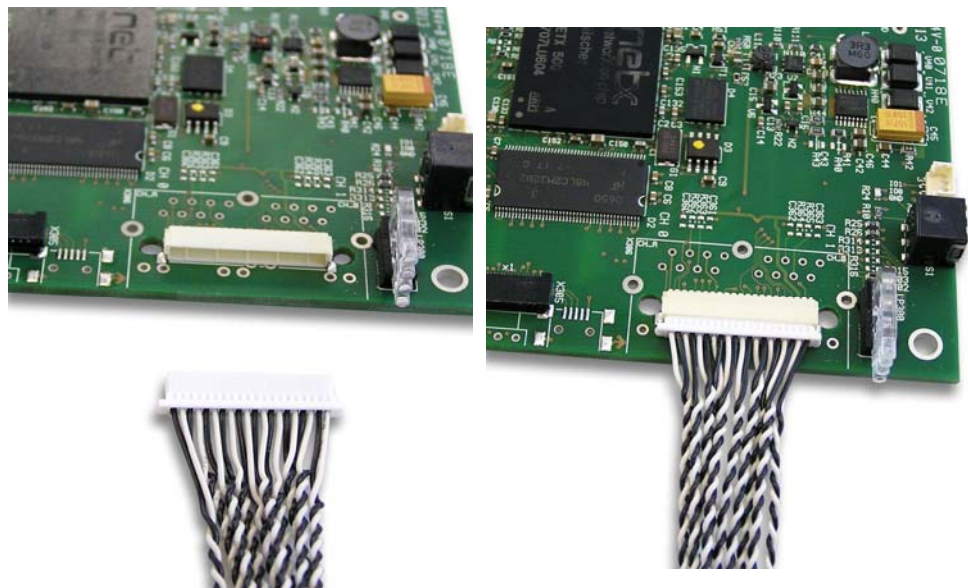


Figure 34: Connect the cable connector Ethernet X4 on the CIFX 104-RE-RF card* with the cable. (*Example in this figure)

8. Mount the AIFX-RE on the front plate of the cifX device.

Connecting the AIFX-DIAG

To connect the diagnosis interface AIFX-DIAG:

9. Connect the cable connector DIAG X1 on the diagnosis interface AIFX-DIAG with the cable.



Important! The contacts on the connection cable must face up!.

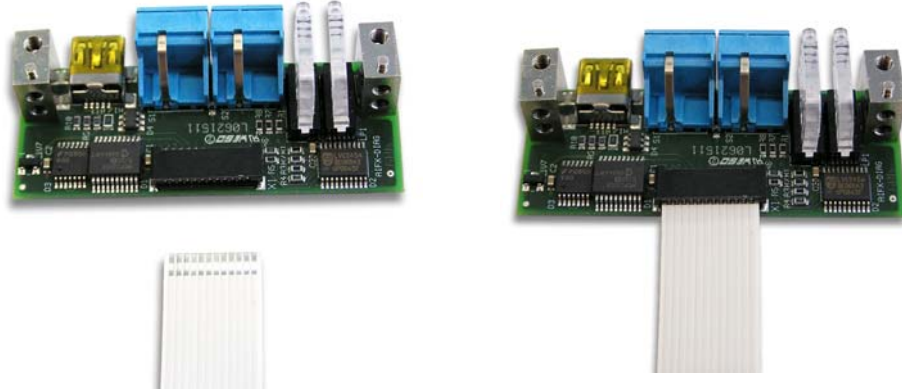


Figure 35: Connect the cable connector DIAG X1 on the diagnosis interface AIFX-DIAG with the cable

10. Connect the cable connector DIAG X3 (or X303) on the CIFX 104-RE\ card with the cable.



Important! The contacts on the connection cable must face up!.

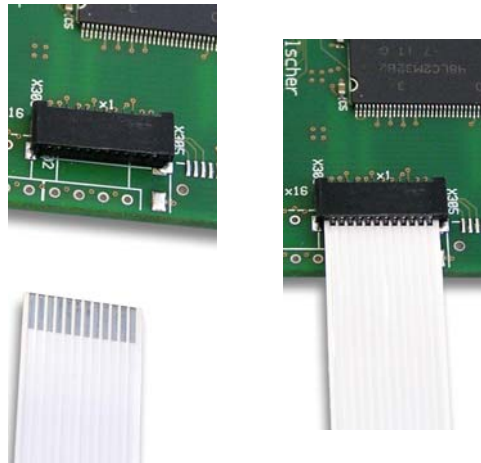


Figure 36: Connect the cable connector DIAG X303 on the CIFX 104-RE-R\F card* with the cable. (*Example in this figure)

11. Mount the AIFX-DIAG on the front plate of the cifX device.

After that:

12. Close the cabinet of the PC or connecting device.
13. Connect the PC or the connecting device to the power supply and switch it on..

7 Installing Software

7.1 System Overview

7.1.1 Configuration and Diagnosis

The following system overviews show which system components must be installed on the PC and how they communicate together to configure the cifX card and to use the diagnosis functions.

cifX Card with Master Protocol

If on the cifX card a Real-Time Ethernet protocol or a fieldbus protocol with Master functionality is operated, the configuration and the diagnosis of the cifX card are done with **SYCON.net**.

The following software components are required:

- Configuration and diagnosis program **SYCON.net** (contains the installed component Online Data Manager ODMV3)
- Device Driver (cifX Device Driver)

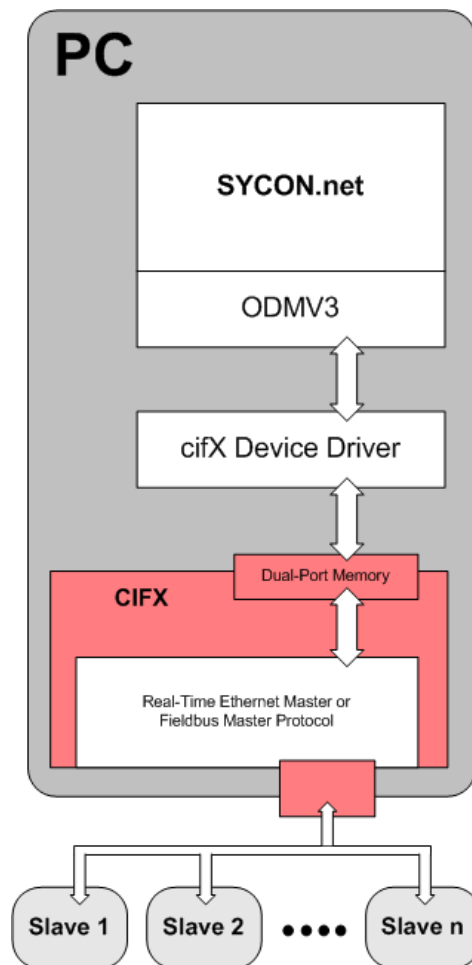


Figure 37: System Overview CifX and SYCON.net

cifX Card with Slave Protocol

If on the cifX card a Real-Time Ethernet protocol or a fieldbus protocol with Slave functionality is operated, the configuration and the diagnosis of the cifX card are done with the program **netX Configuration Tool** or with **SYCON.net**.

If you use the **netX Configuration Tool**, the following software components are required:

- Configuration and diagnosis program **netX Configuration Tool**
- Device Driver (cifX Device Driver)

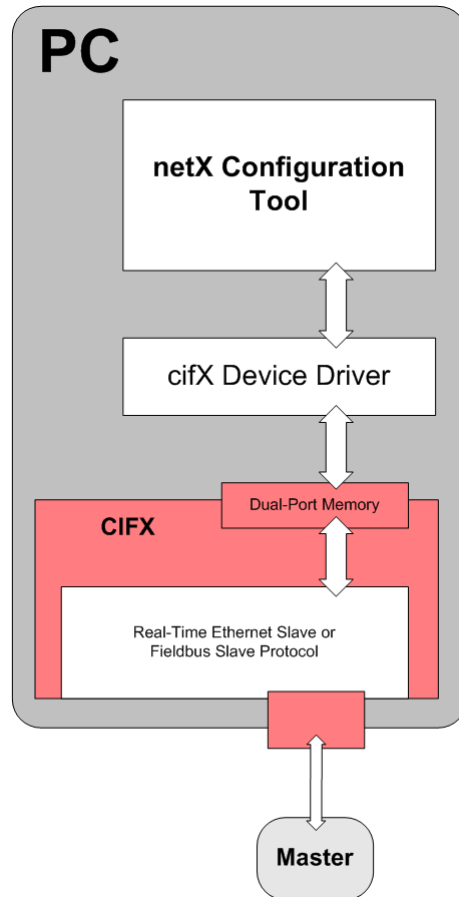


Figure 38: System Overview CIFS and netX Configuration Tool

If you use **SYCON.net**, the following software components are required:

- Configuration and diagnosis program **SYCON.net** (contains the installed component Online Data Manager ODMV3)
- Device Driver (cifX Device Driver)

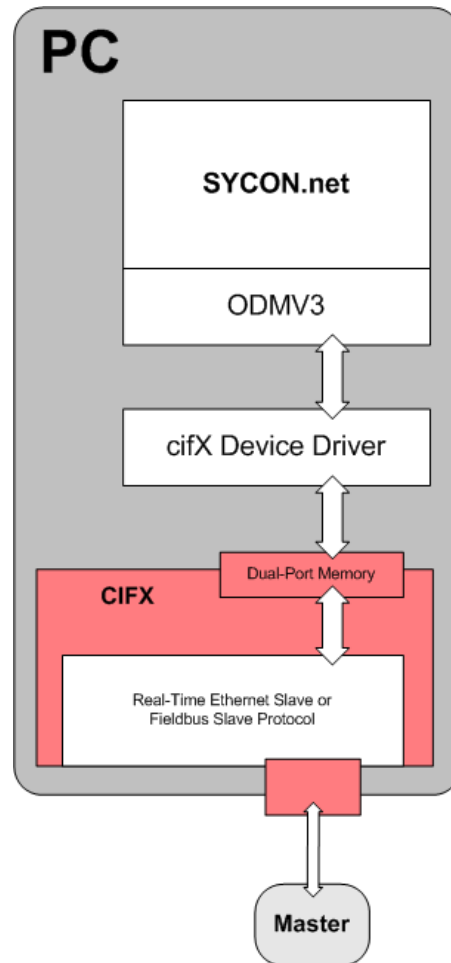


Figure 39: System Overview CifX and SYCON.net

7.1.2 Diagnosis via Ethernet Connection

Via Ethernet the program **SYCON.net** can establish for diagnosis purposes a connection to another PC, in which the cifX card is installed.

The system overview in *Figure 40* shows which components must be installed on which PC and how they communicate together, so that the diagnosis functions can be used.

The following software components are required for PC 1:

- Program **SYCON.net** (contains the installed component Online Data Manager ODMV3)

The following software components are required for PC 2:

- Server program (cifX TCP/IP server)
- Device Driver (cifX Device Driver)

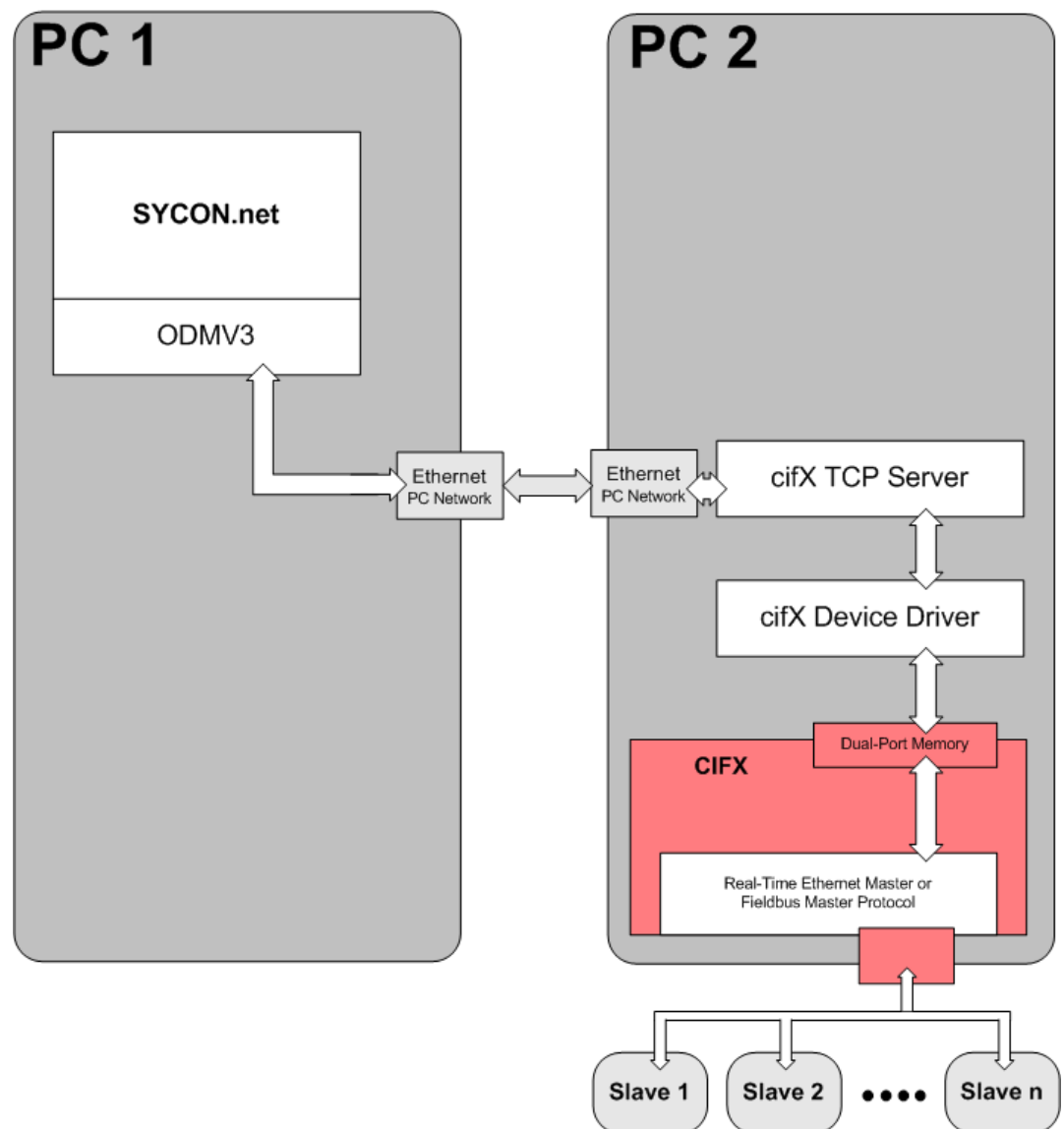


Figure 40: System Overview CIFX (Master) and Diagnosis Connection via Ethernet

The *Figure 40* shows the case that the cifX card works as a Master with several connected Slave devices. It is also possible that the cifX card works as a Slave.

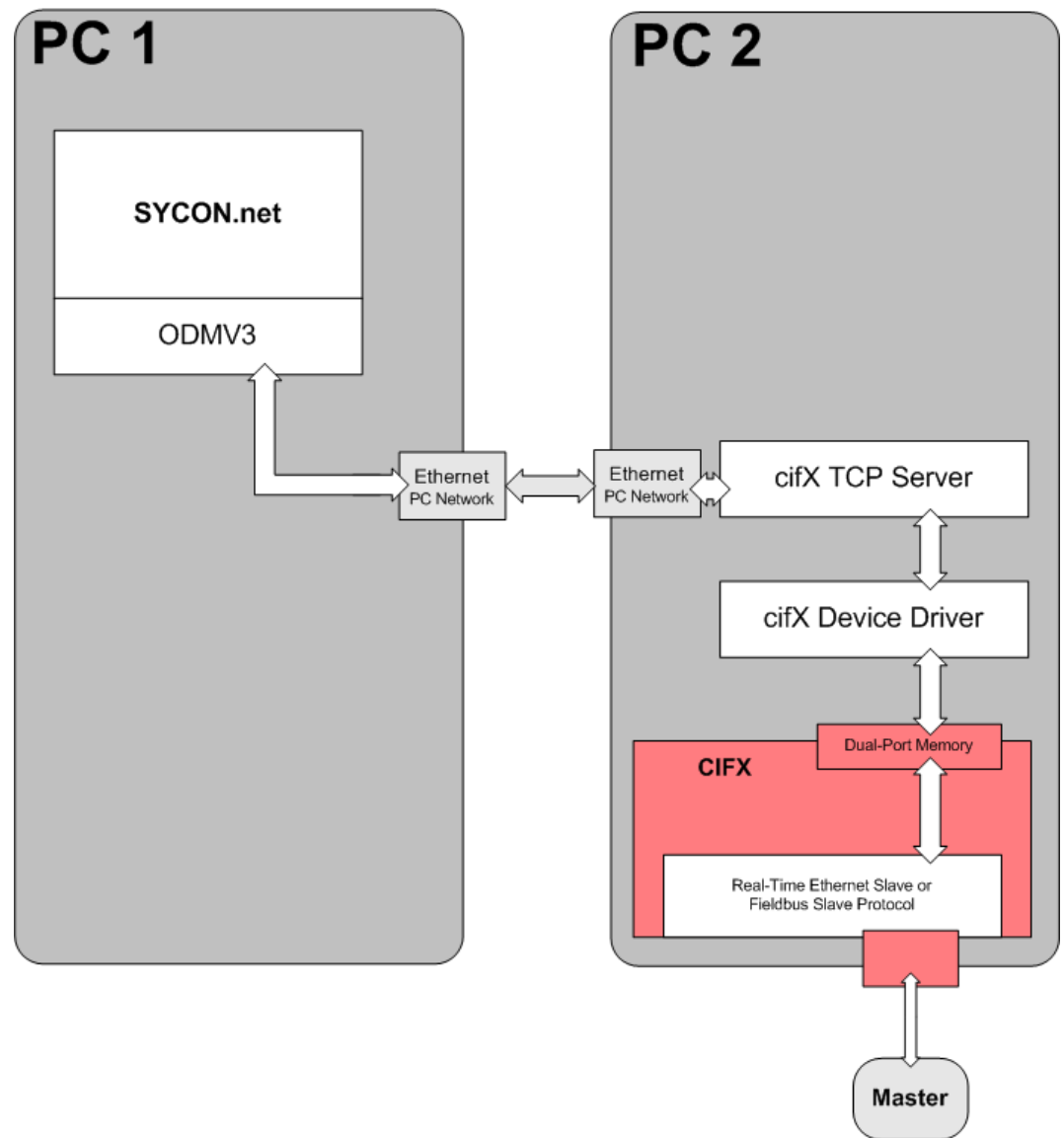


Figure 41: System Overview CIFX (Slave) and Diagnosis Connection via Ethernet

The **Figure 41** only shows the case that the cifX card works as a Slave.

-
- Requirements for Use
- The cifX card in PC2 must be installed and operational, i. e., firmware and configuration must already be loaded on the cifX card.
- The device driver (cifX device driver) must be installed and started.
- The server program (cifX TCP/IP server) must be started.

The cifX TCP/IP server program is on the cifX DVD in the directory *Tools \ cifXTCPServer * and has the name *cifXTCPServer.exe*. The program must not be installed, but needs only be executed.

**Note:**

1. The connection shown in *Figure 40* can only be used for diagnosis purposes.
2. With **SYCON.net** a firmware download from PC1 to the cifX card in PC2 can not be executed. A firmware download to the cifX card can be executed in PC2
 - with the program **SYCON.net** (Master or Slave), as shown in *Figure 37* on page 96 or
 - with the program **netX Configuration Tool** (only Slave) as shown in *Figure 38* on page 97.
3. With **SYCON.net** a configuration download from PC1 to the cifX card in PC2 can not be executed because the configuration file is not stored on the PC. A configuration download to the cifX card can be executed in PC2
 - with the program **SYCON.net** (Master or Slave), as shown in *Figure 37* on page 96 or
 - with the program **netX Configuration Tool** (only Slave) as shown in *Figure 38* on page 97.

7.2 Installing the cifX Device Driver

7.2.1 cifX Device Driver from V1.0.0.0

On the cifX-DVD the setup for the driver **cifX Device Driver** v1.0.0.0 is in the directory: `\Driver\Windows\cifX Device Driver Setup.exe`

In the setup, everything is included.

- For Windows® 7 the setup detects, if the 32 bit driver or the 64 bit driver are installed.
- The setup will install the INF files on the PC.

7.2.2 Installing the cifX Device Driver via Setup

You can install the cifX device driver via the cifX device driver Setup before the hardware has been installed.



Note: If the driver is installed via the cifX Device Driver Setup, that means, **the driver gets installed first and only then the hardware**.

To install the **cifX device driver** before the hardware is installed, proceed as described hereafter:

1. Start the **cifX Device Driver** Setup.
 - Put the cifX installation DVD into the DVD drive of your PC.
 - In the netX startup screen click to the menu *Software and Tools > cifX Drivers*.
 - Click to the *Windows* folder.
- Or
- On the CIFX DVD open the directory `[drive letter]:\Driver\Windows\`.
- Start the setup by double-clicking to the setup file *cifX device driver setup.exe*.
- The window **Select a language** is displayed.
2. Select the language.
3. Install the **cifX Device Driver**.
 - Therefore follow to the instructions on the screen.
 - The **cifX Device Driver InstallShield Wizard** guides you through the installation.

7.2.3 Installing cifX Device Driver after Hardware Installation



Note: If the hardware gets installed at the PC before the cifX Device Driver Installation has been done, the Windows® Found New Hardware Wizard is started and the operating system Windows® asks for the driver. This is the mode, if **the hardware is installed first and only then the driver.**

To install the **cifX Device Driver** after the hardware was installed, proceed as described hereafter:

1. After installation of the cifX card restart your PC.
 - Windows® 2000, Windows® XP, Windows® Vista and Windows® 7 recognize the PCI based cifX card automatically.
 - The message **Found New Hardware** is displayed and the **Found new Hardware Wizard** is started.
2. Select **No, not this time.**
 - Click to **Next >**.
3. Select **Install from a list or specific location (Advanced).**



Figure 42: Found new Hardware Wizard - Indicate Software Source

4. Insert the installation DVD now.
 - Click to **Next >**.
 - The **Found new Hardware Wizard** asks you to select the research- and installation options.

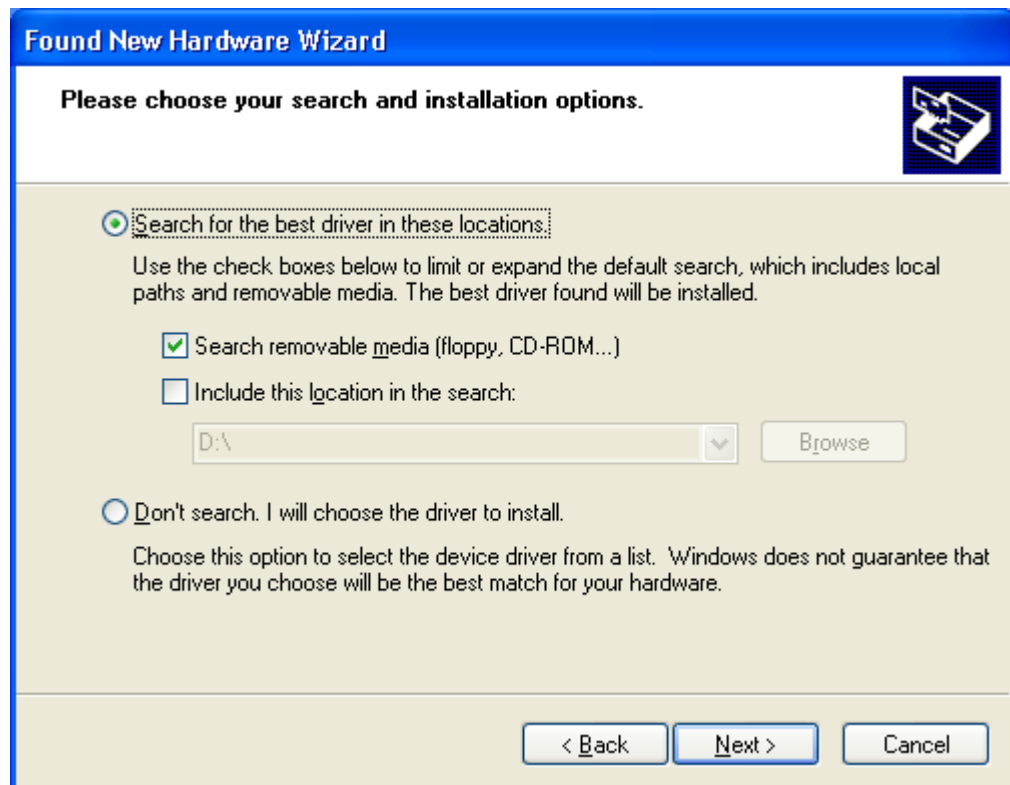


Figure 43: Found new Hardware Wizard - Select research- and installation options

5. Select **Search for the best driver in these locations.**
6. Activate **Search removable media (floppy, DVD...).**
- Click to **Next >.**
- The driver software for the **cifX Device Driver** gets installed.

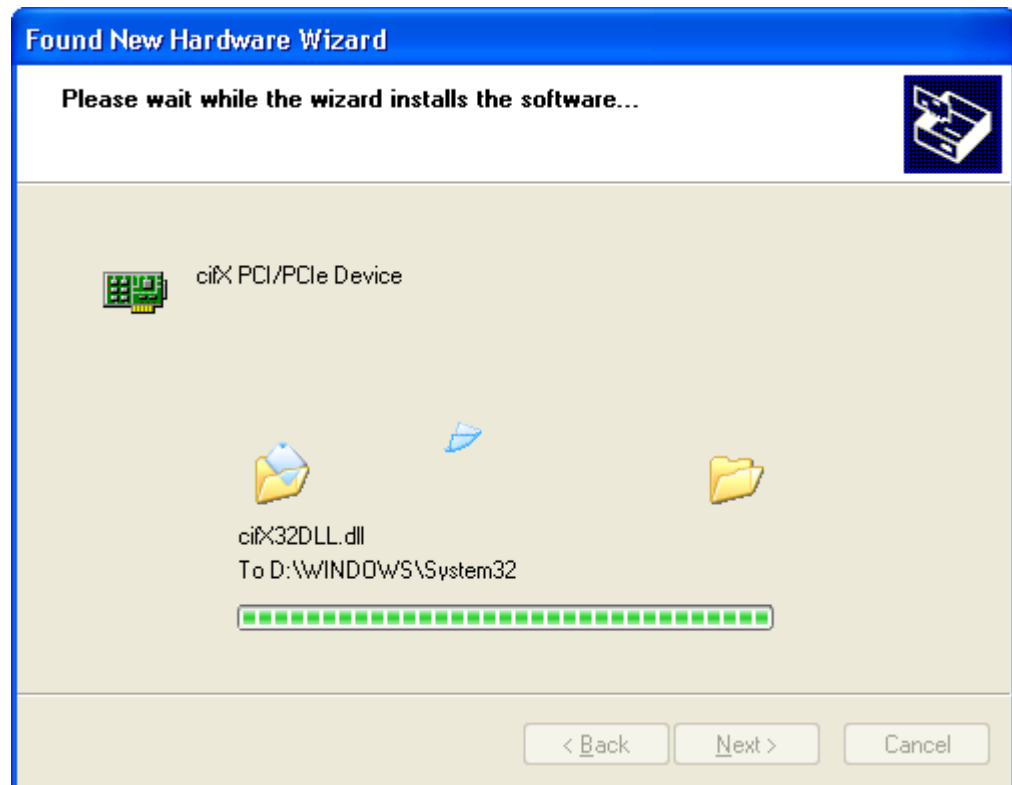


Figure 44: Found new Hardware Wizard - Software gets installed (Example with PCI devices)

- The **Found new Hardware Wizard** indicates the **cifX PCI/PCle Device** software installation is complete.

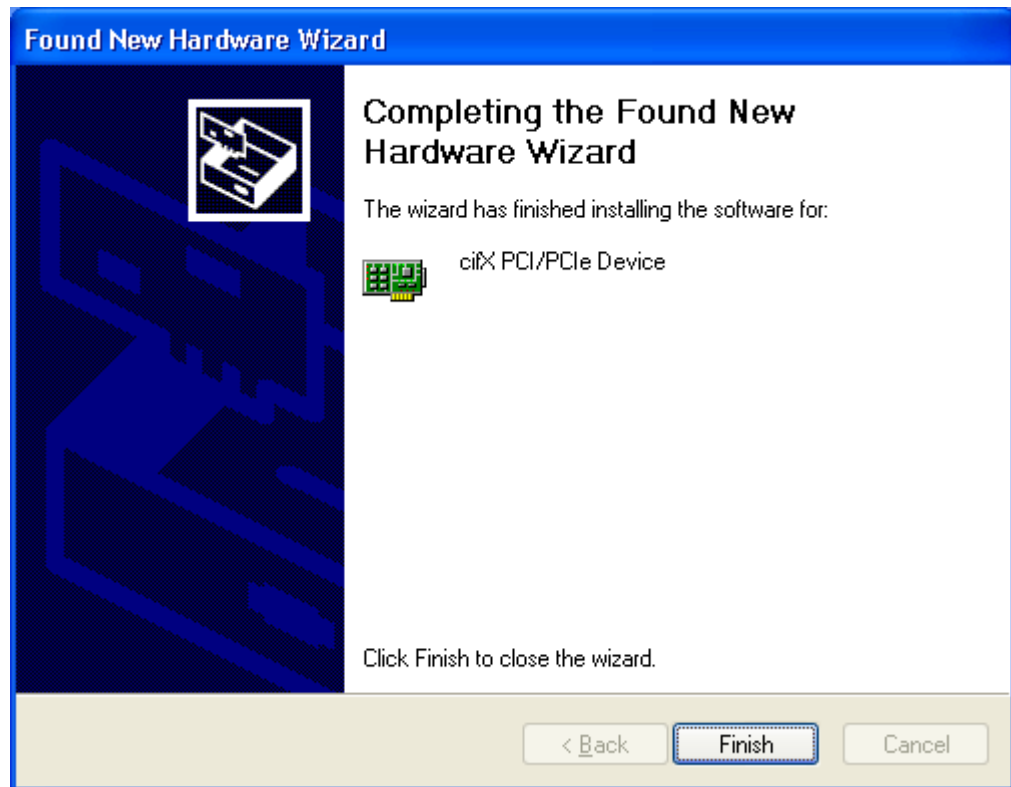


Figure 45: Found new Hardware Wizard - Software installation has been completed (Example with PCI devices)

7. Click in **Found new Hardware Wizard > Completing the Found new Hardware Wizard** to **Finish**.

- The installation of the **cifX Device Driver** is complete.

8. Check in the **Computer Manager**, if your cifX card installed correctly.
 - Therefore open the **Computer Manager** as follows: Desktop symbol **My Computer** > right click **Properties** > window **System Properties** > tab **Hardware** > button **Computer Manager**.
 - Check, if the view of your **Computer Manager** corresponds to the marked area in the view hereafter.

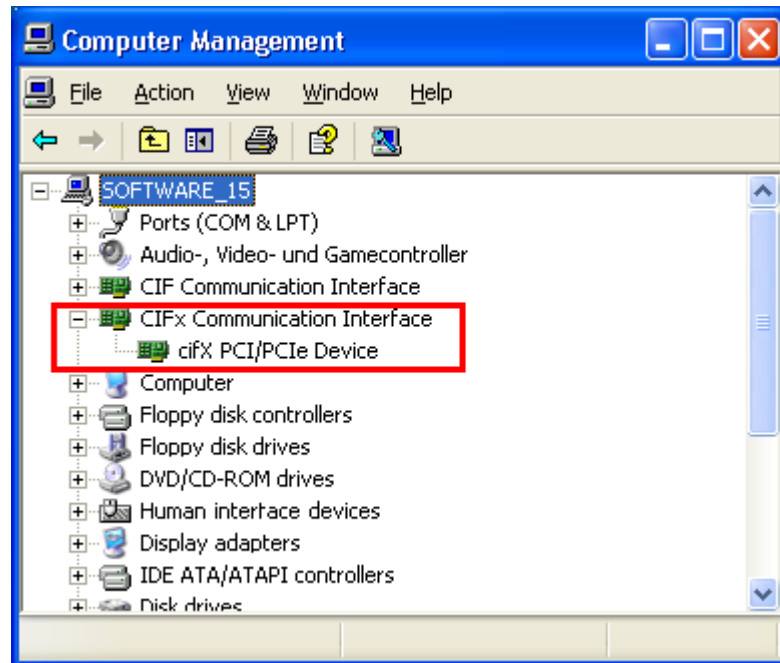


Figure 46: Device Manager > cifXPCI/PCIe Device - correctly installed (Example with PCI devices)



Note: The cifX card has to be configured.

7.3 Install CIFX 104 (ISA) – Windows XP

Precondition: The CIFX Device Driver was already installed on the used PC. If this is not the case yet, then run the setup program **cifX Device Driver Setup.exe**. This setup program installs the driver and the required INF files.

Do the following steps to install a CIFX 104 card, e. g. to reserve the memory range and if necessary one interrupt at the operating system for the card:

1. Start the Hardware Wizard
 - Click **Start > Control Panel**.
 - Then click **Add Hardware**



- Click **Next >**

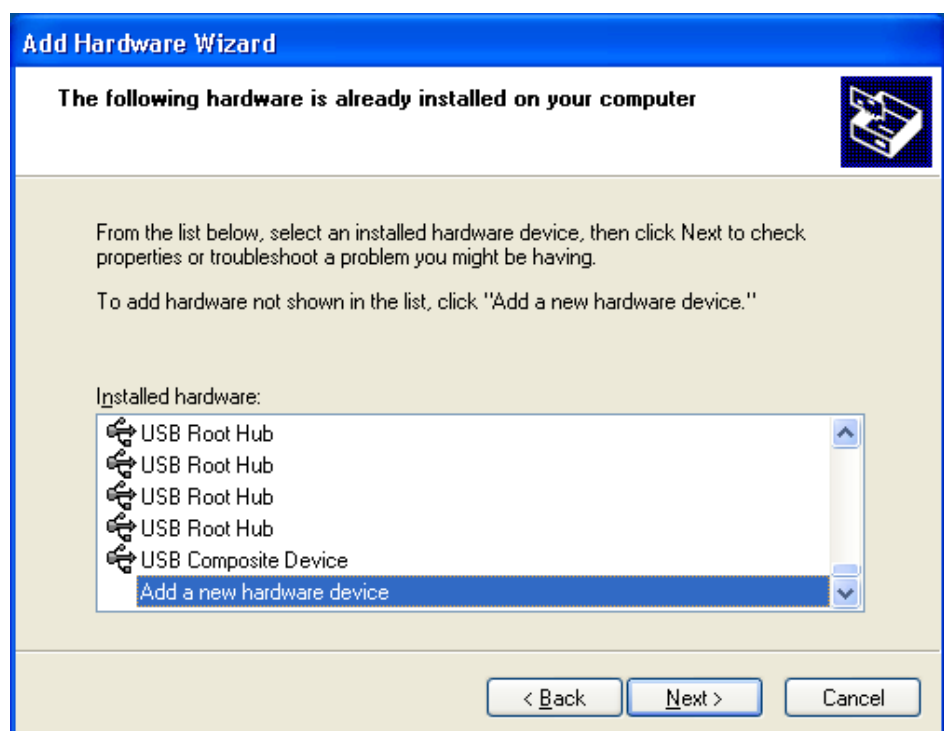
2. Hardware Wizard

- Select **Yes, I have already connected the hardware**



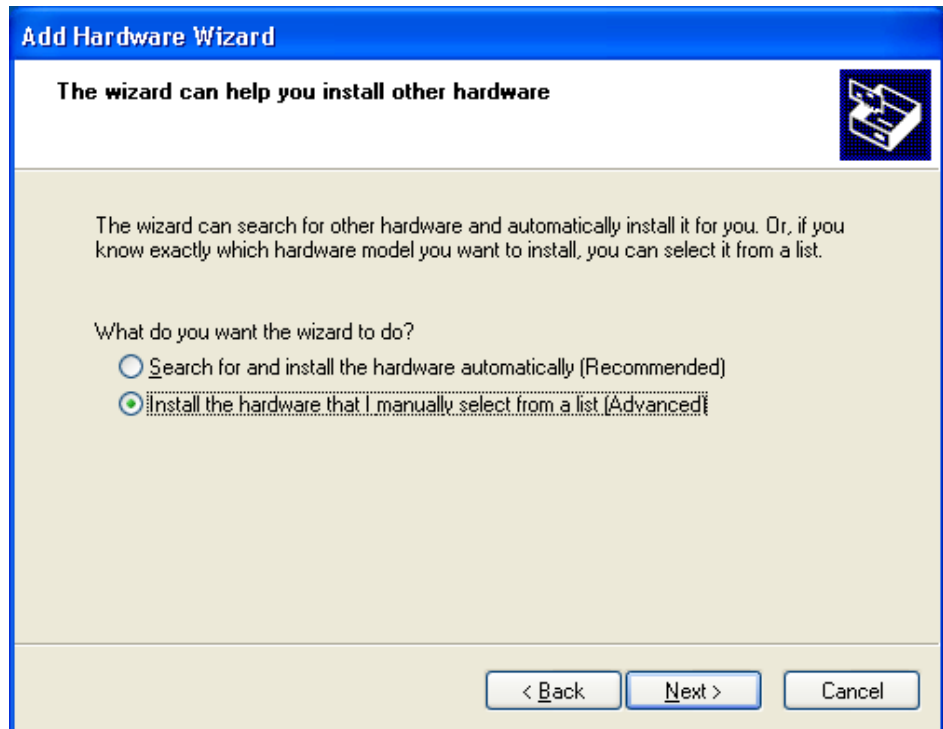
- Click **Next >**

- Move the scroll bar to the bottom to display the end of the list **Installed Hardware**.
- Select **Add a new hardware device**.

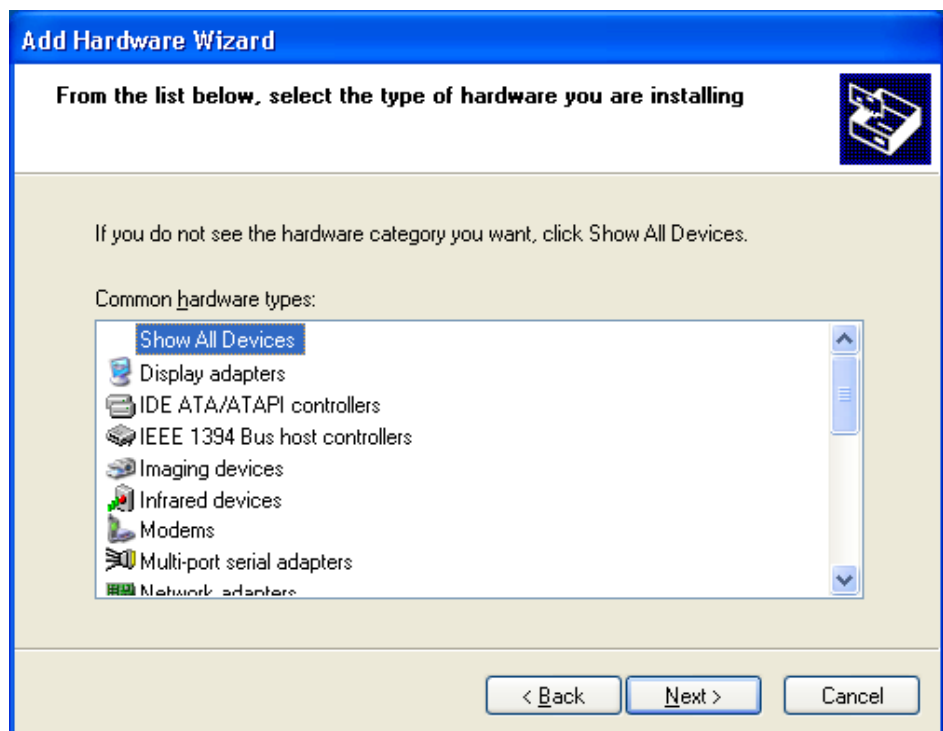


- Click **Next >**

- Select **Install the hardware that I manually select from a list (Advanced)**

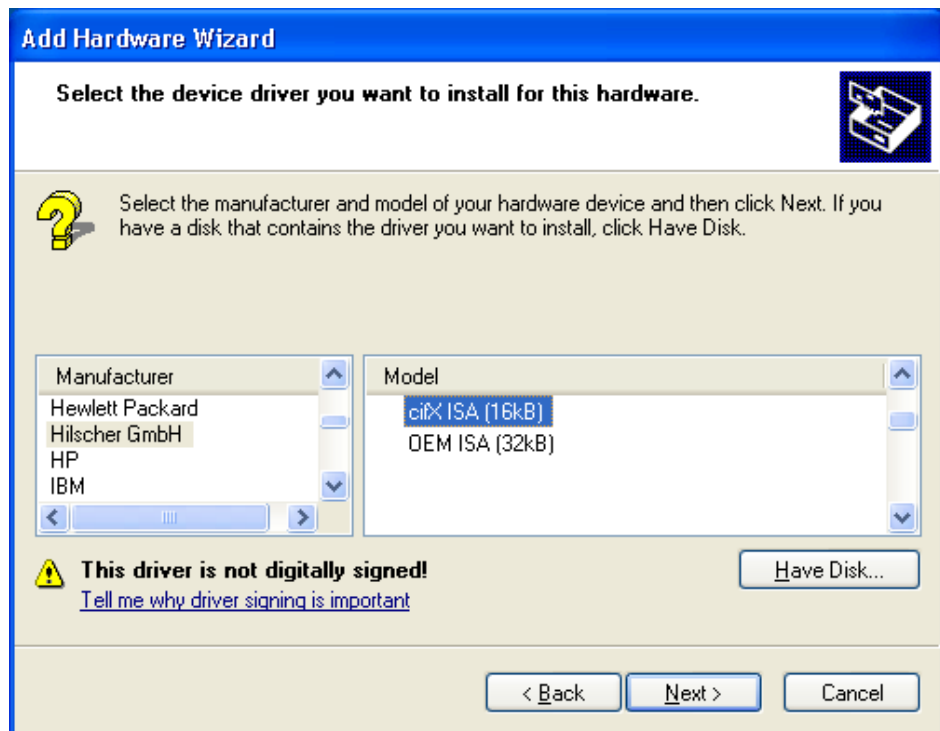


- Click **Next >**
- Select **Show All Devices**



- Click **Next >**

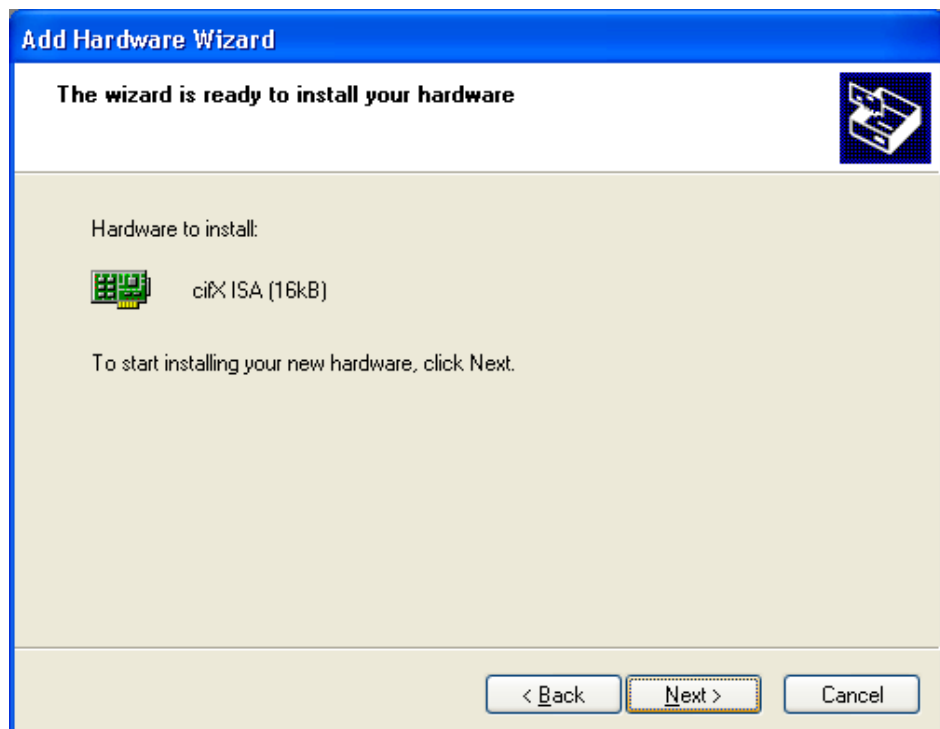
- Select from the list of **Manufacturer > Hilscher GmbH**
- Then select from the list of **Model > ciX ISA (16kB)**



- Click **Next >**

3. Install

- Click **Next >**



- The ciX Device Driver is installed

4. Finish or change resources

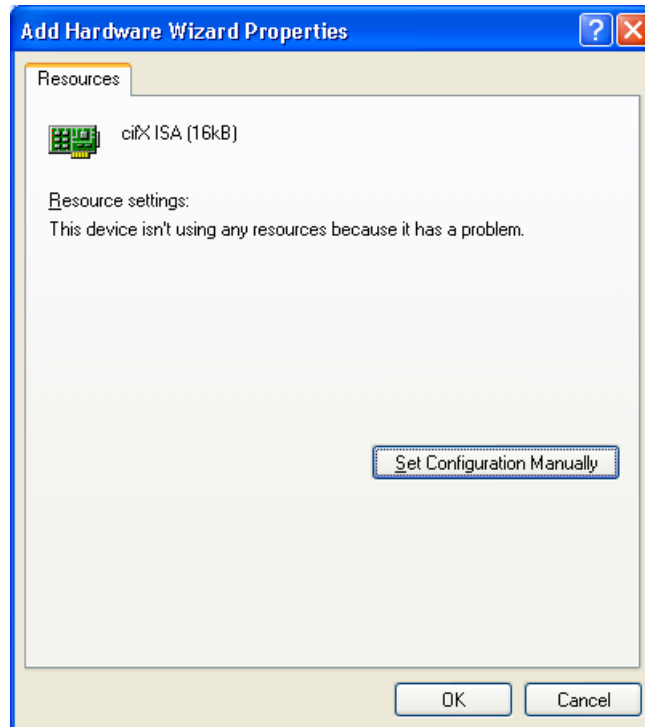
- If the CIFX 104 card is jumpered for memory address D0000 and no interrupt jumper is set on the CIFX 104 card (polling), then click **Finish**.



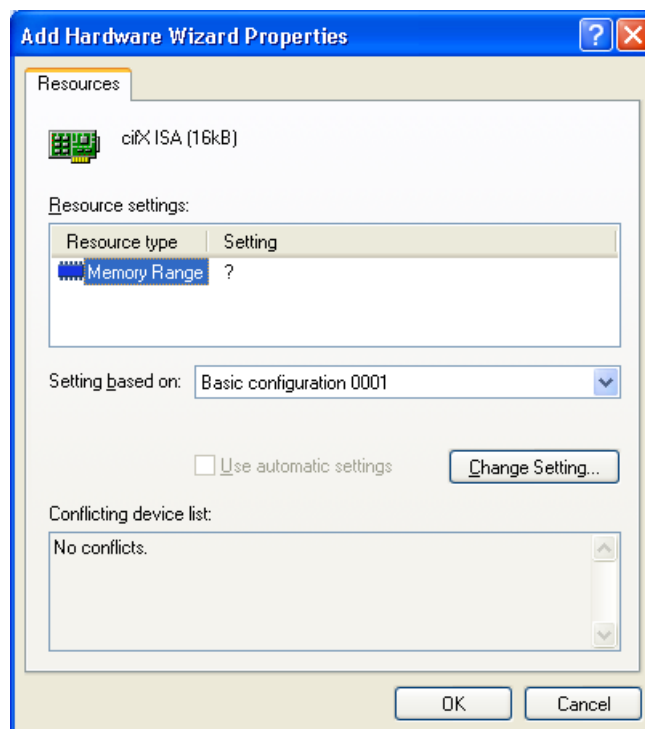
- If you have clicked on Finish, then restart the PC.
- If the CIFX 104 card is jumpered for a memory address other than D0000 and no interrupt jumper is set on the CIFX 104 card (polling), then click **View of change resources for this hardware (Advanced)**. Continue with section *Select Memory Address for polling (Basic Configuration 0001)* on page 113.
- If the CIFX 104 card is to be used with interrupt then click **View of change resources for this hardware (Advanced)**. Continue with section *Select Memory Address and interrupt (Basic Configuration 0002)* on page 116.

Select Memory Address for polling (Basic Configuration 0001)

- Click **Set Configuration Manually**

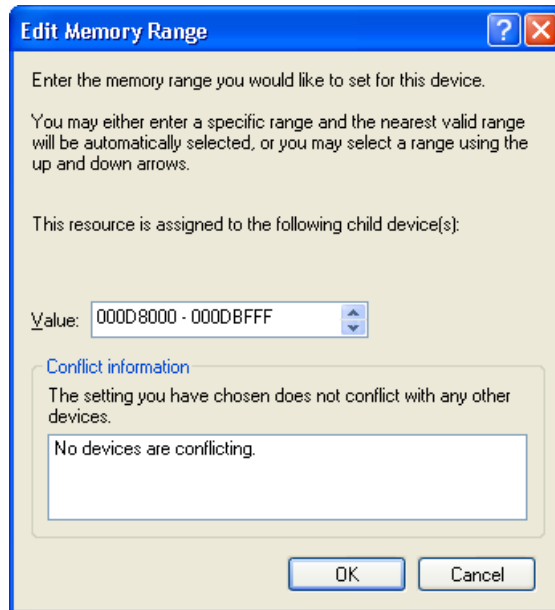


- At **Settings based on** select **Basic configuration 0001**.
- Select **Memory Range**

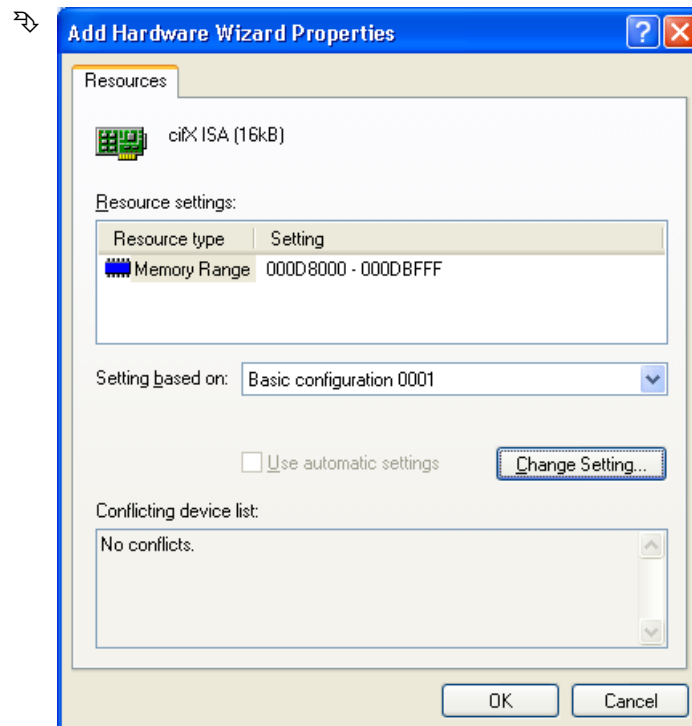


- Click **Change Settings**

- Set the memory address: e. g. address D8000



- Click **OK**



- Click **OK**

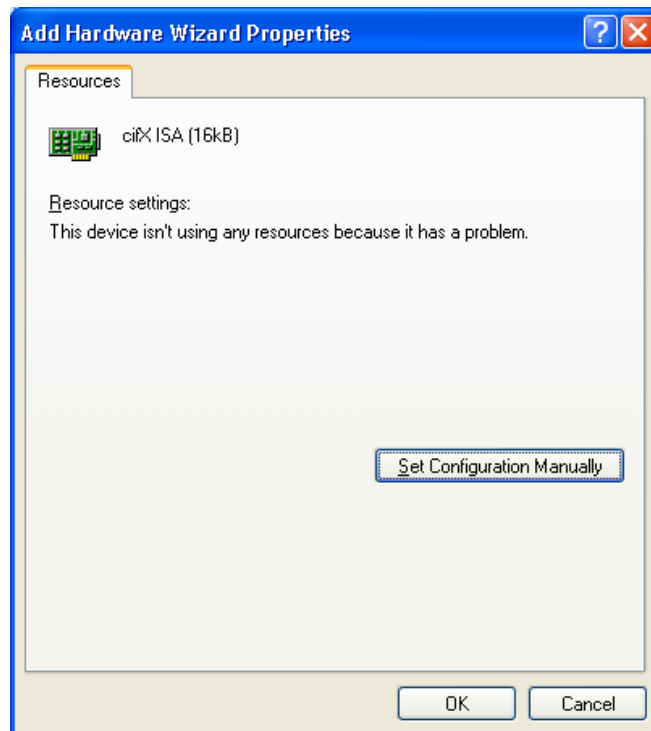
- Click **Finish**.



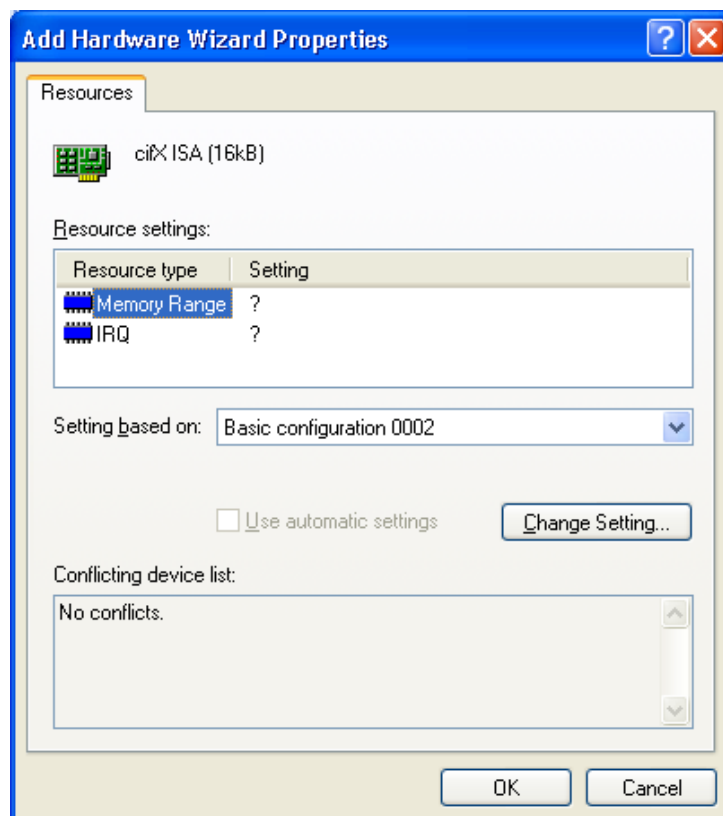
- Restart the PC.

Select Memory Address and interrupt (Basic Configuration 0002)

- Click **Set Configuration Manually**

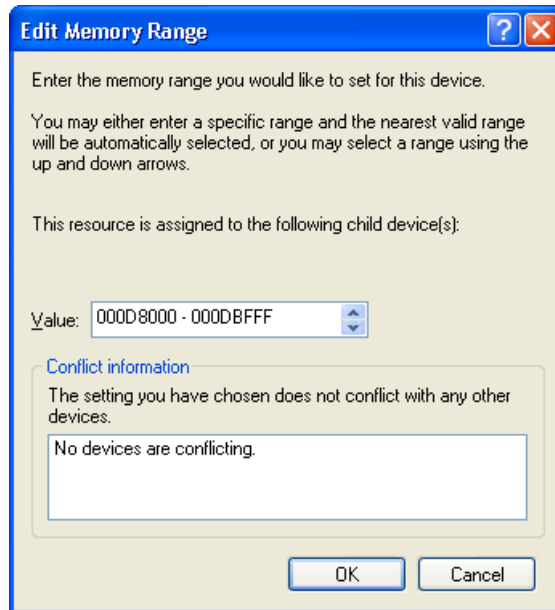


- At **Settings based on** select **Basic configuration 0002**.
- Select **Memory Range**



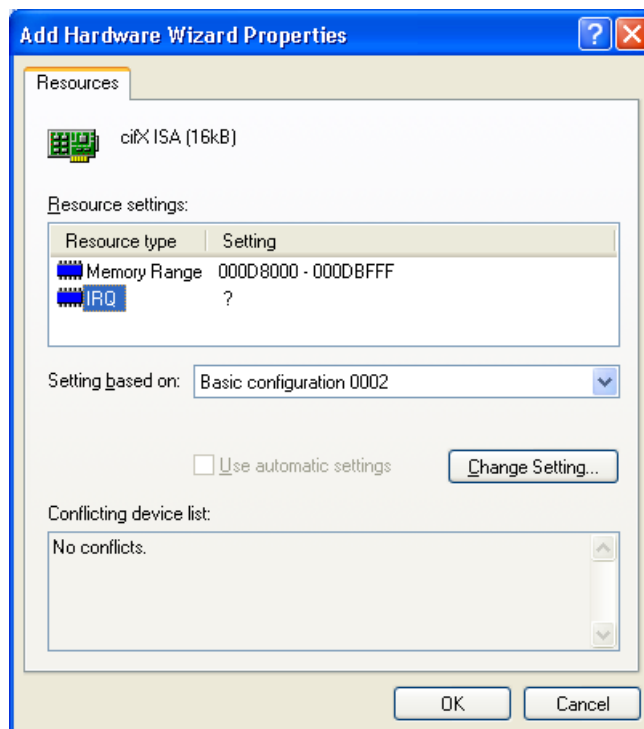
- Click **Change Settings**

- Set the memory address: e. g. address D8000



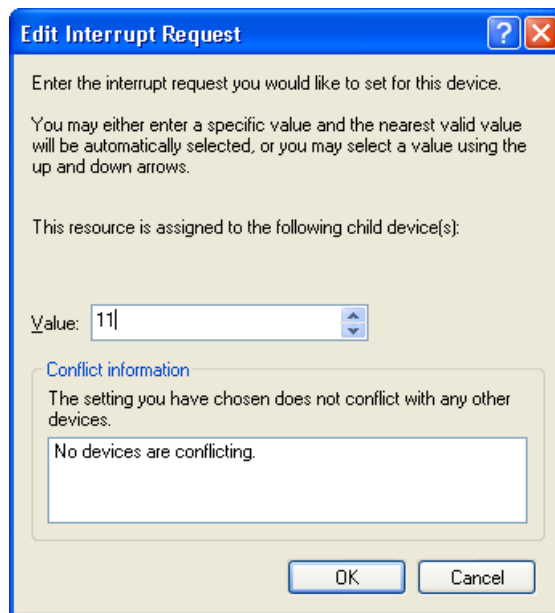
- Click **OK**

- Select **IRQ**

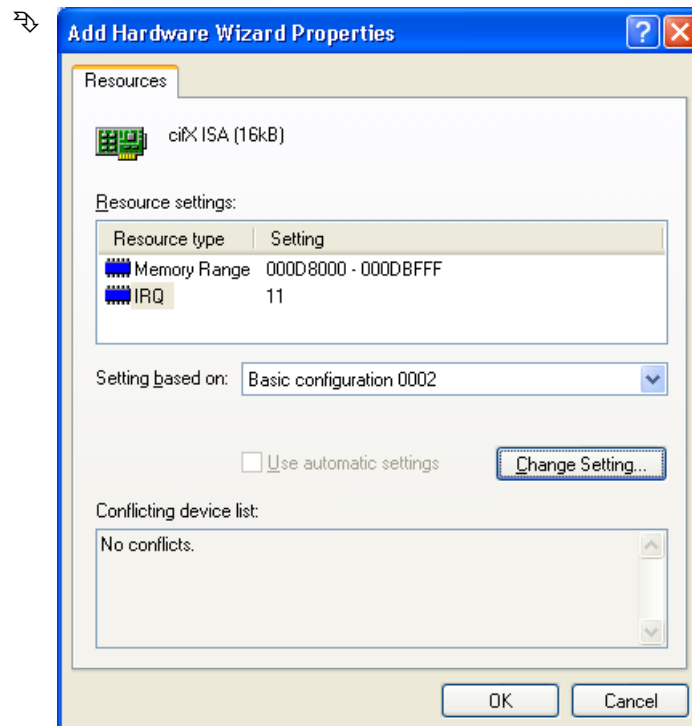


- Click **Change Settings**

- Set the interrupt number: e. g. interrupt 11



- Click **OK**



- Click **OK**

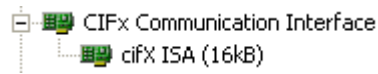
- Click **Finish**.



- Restart the PC.

Check in the Device Manager if the cifX ISA is installed properly

- Open the **Device Manager**: Desktop symbol **My Computer** > right mouse button **Properties** > Tab **Hardware** > button **Device Manager**.
- Check, if the display in the **Device Manager** shows **cifX ISA (16kB)**



If an exclamation mark is shown with **cifX ISA (16kB)**

- If an exclamation mark is shown with **cifX ISA (16kB)**, then either a resource conflict exists or the requested resources are not available.
- Select from the context menu on **cifX ISA (16kB)** > **Properties**.
- Select the tab **Resources**.
- Change the setting for the memory range respectively the interrupt with **Set Configuration Manually**, as described in section *Select Memory Address for polling (Basic Configuration 0001)* on page 113 or in section *Select Memory Address and interrupt (Basic Configuration 0002)* on page 116.

7.4 Install CIFX 104 (ISA) – Windows 7

Precondition: The CIFX Device Driver was already installed on the used PC. If this is not the case yet, then run the setup program **cifX Device Driver Setup.exe**. This setup program installs the driver and the required INF files.

Do the following steps to install a CIFX 104 card, e. g. to reserve the memory range and if necessary one interrupt at the operating system for the card:

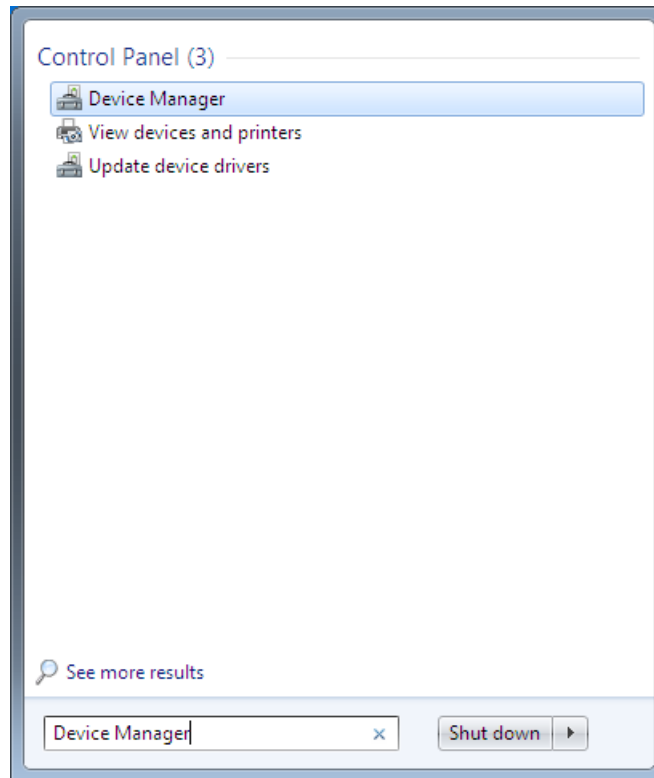
1. Open Start

- Click on Start



2. Search and start the Device Manager

- Enter **Device Manager** into the search field

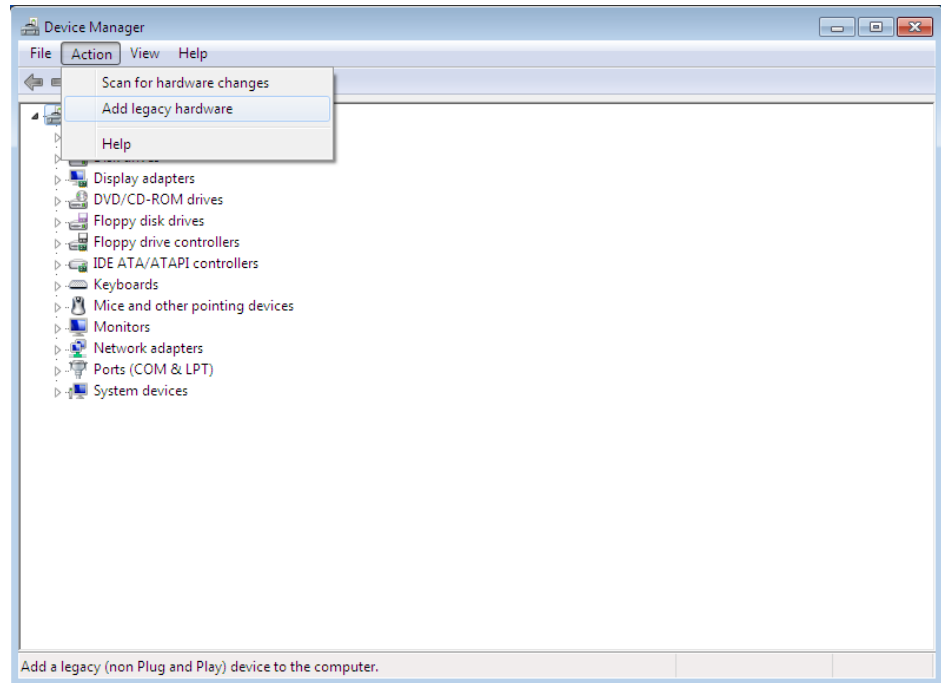


- Click on Device Manager

- The Device Manager starts

3. Add legacy hardware

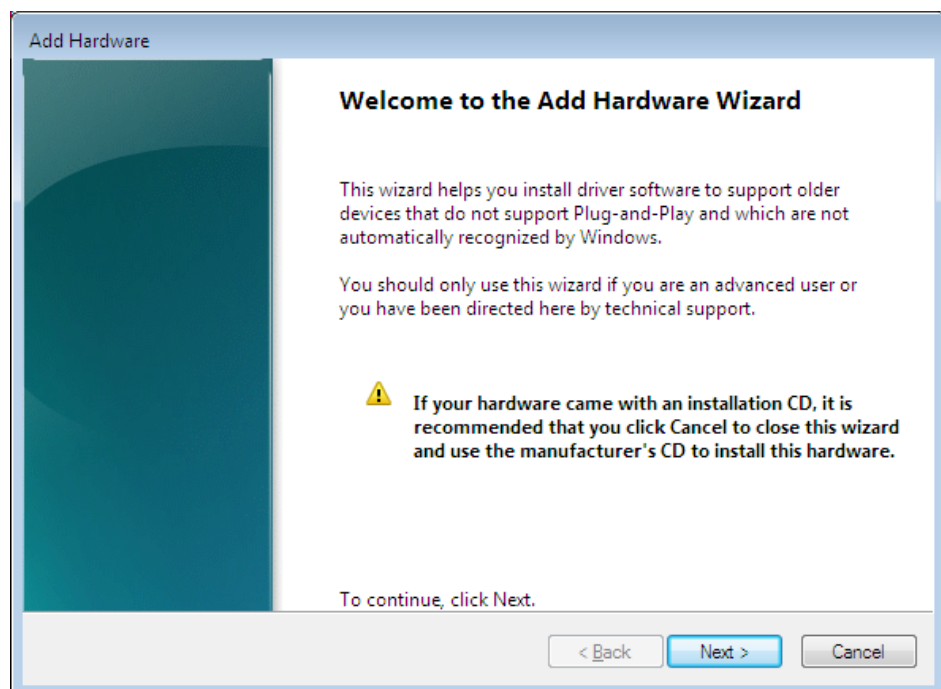
- In the Device manager click on the any element of the tree, e. g. select the top element of the tree
- Select from the menu **Action > Add legacy hardware**



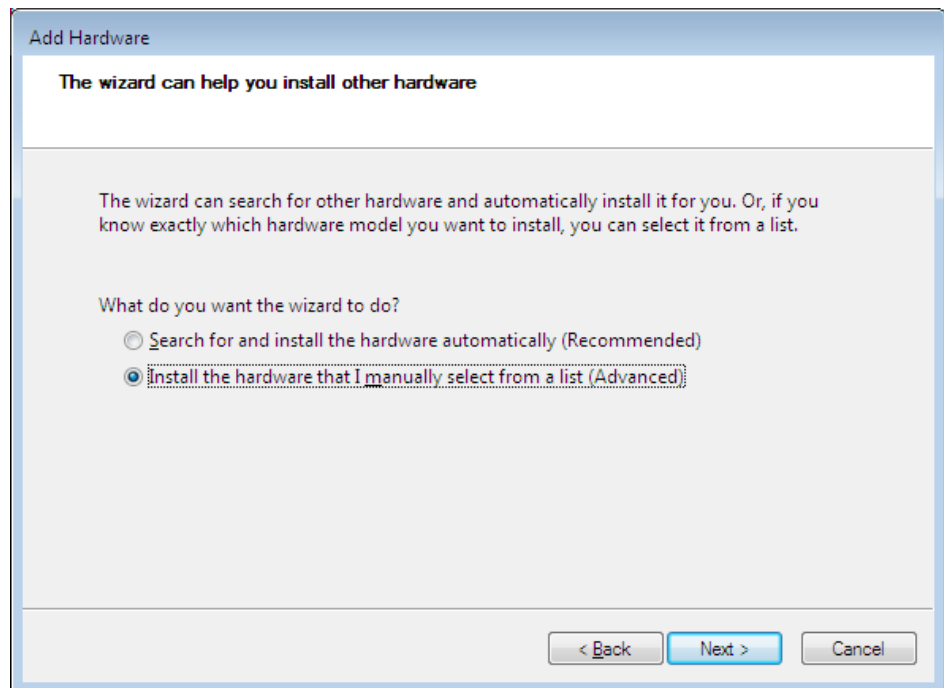
➤ The Hardware Wizard starts

4. Hardware Wizard

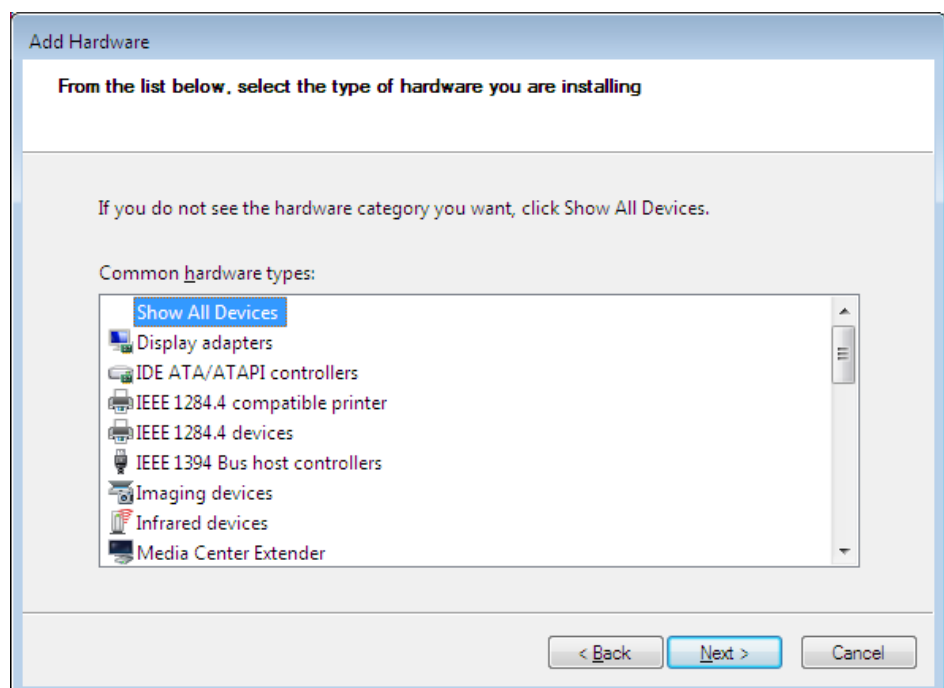
- Click **Next >**



- Select **Install the hardware that I manually select from a list (Advanced)**

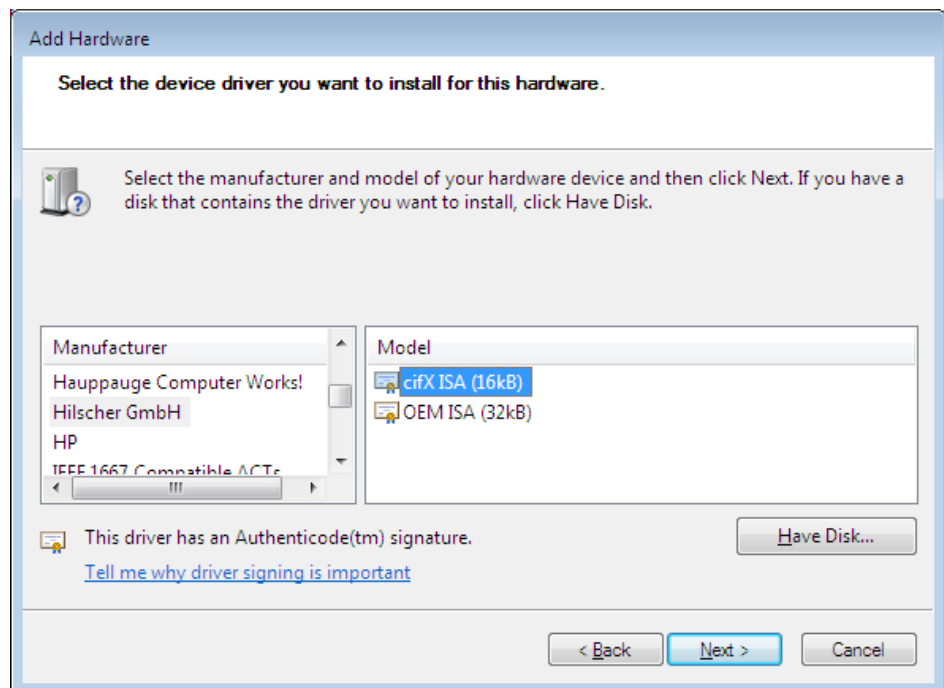


- Click **Next >**
- Select **Show All Devices**



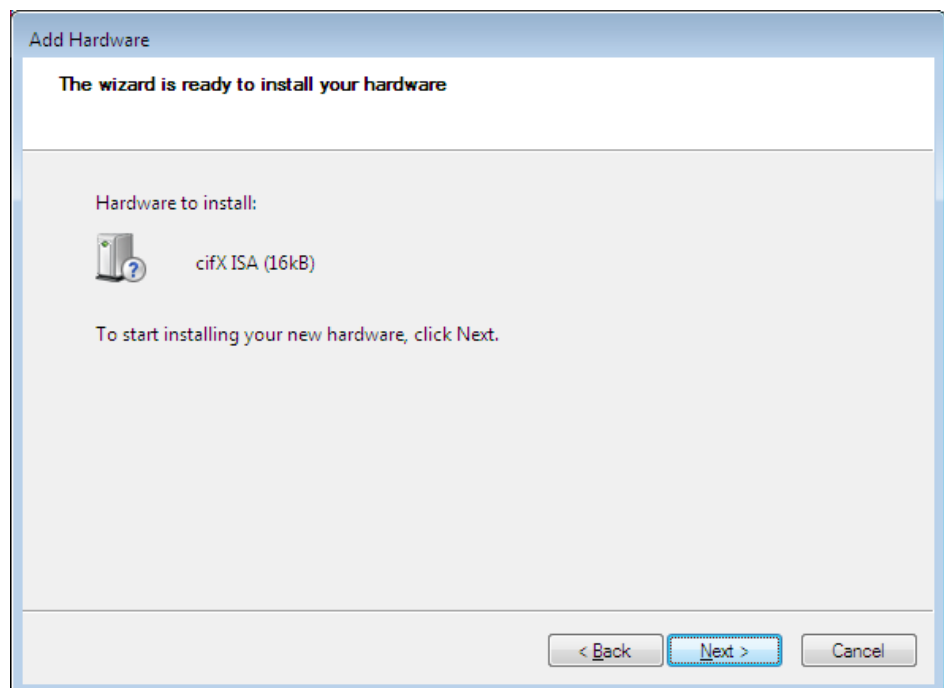
- Click **Next >**

- Wait until windows has created the device list. This can take a while.
- Select from the list of **Manufacturer** > **Hilscher GmbH**
- Then select from the list of **Model** > **cifX ISA (16kB)**



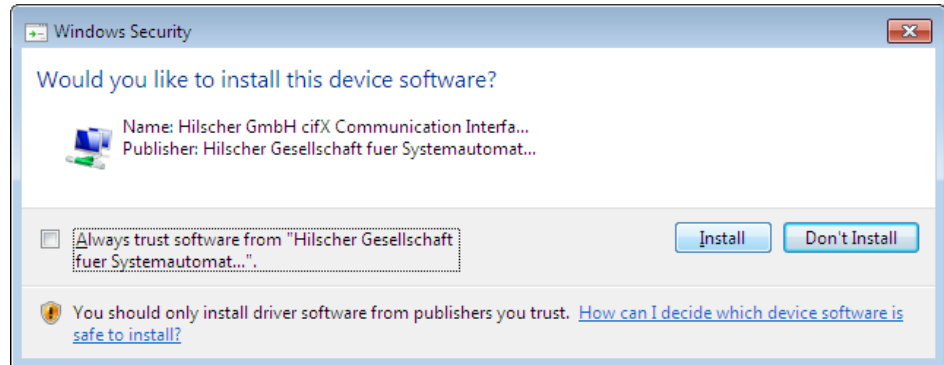
- Click **Next >**

- Click **Next >**



5. Install

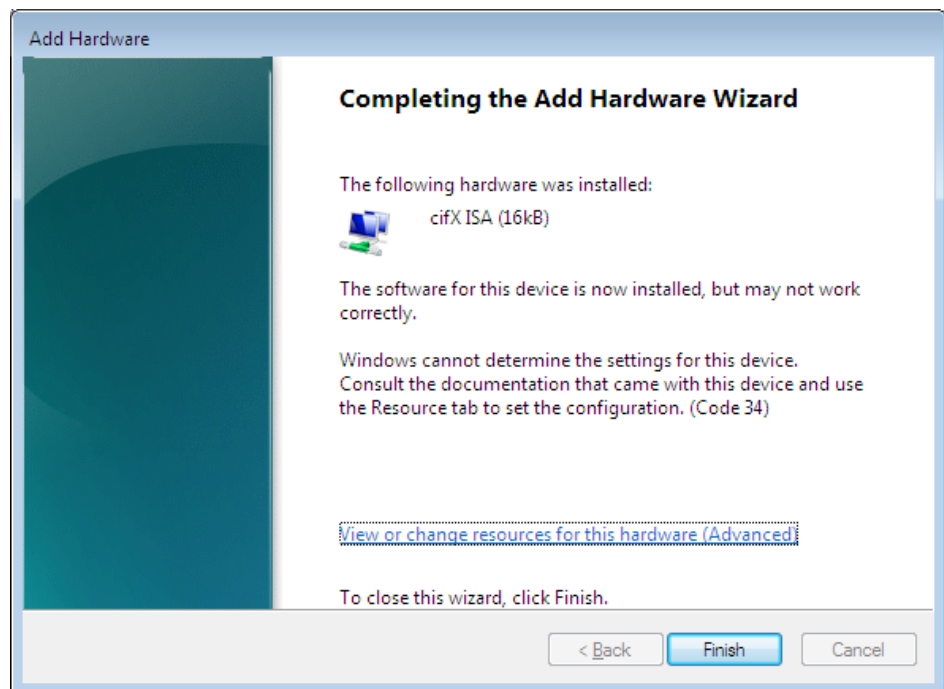
- If the Windows Security asks, then click **Install**



- The cifX Device Driver is installed

6. Finish or change resources

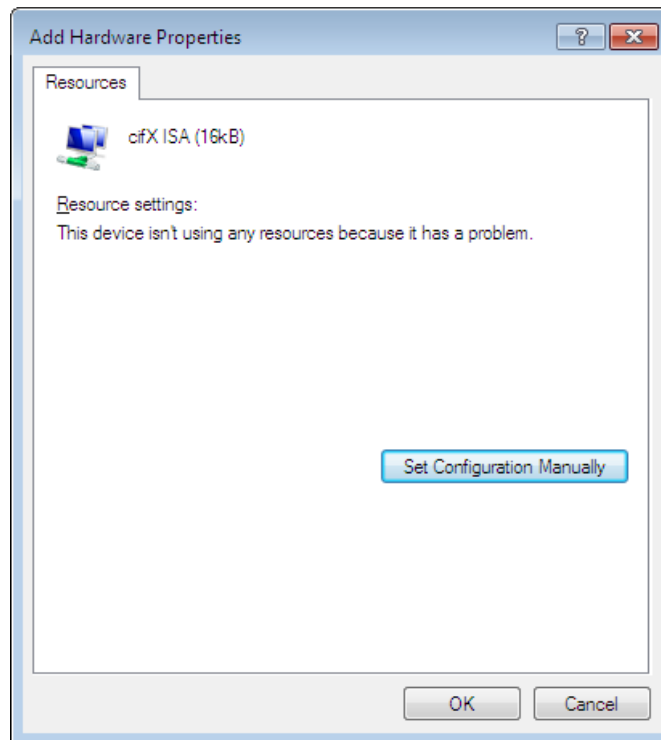
- If the CIFX 104 card is jumpered for memory address D0000 and no interrupt jumper is set on the CIFX 104 card (polling), then click **Finish**.



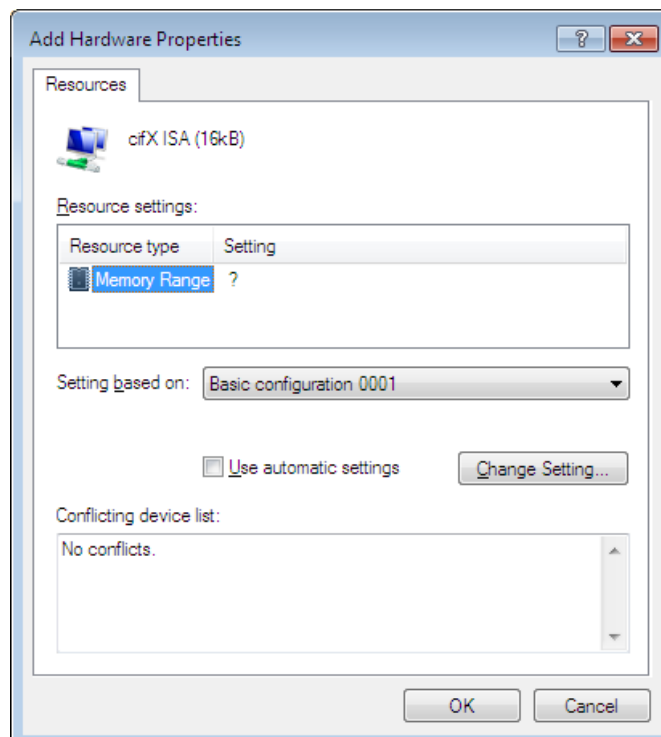
- If you have clicked on Finish, then restart the PC.
- If the CIFX 104 card is jumpered for a memory address other than D0000 and no interrupt jumper is set on the CIFX 104 card (polling), then click **View of change resources for this hardware (Advanced)**. Continue with section *Select Memory Address for polling (Basic Configuration 0001)* on page 126.
- If the CIFX 104 card is to be used with interrupt then click **View of change resources for this hardware (Advanced)**. Continue with section *Select Memory Address and interrupt (Basic Configuration 0002)* on page 129.

Select Memory Address for polling (Basic Configuration 0001)

- Click **Set Configuration Manually**

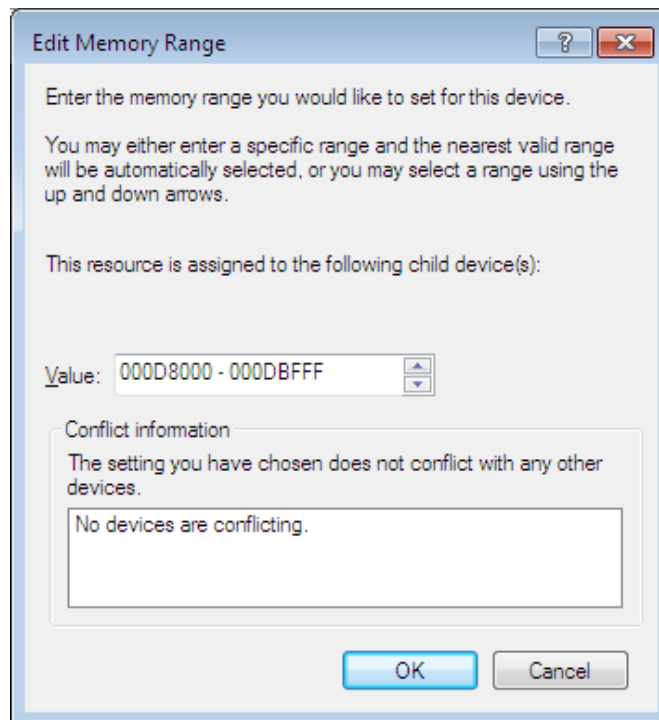


- Uncheck **Use automatic settings**
- At **Settings based on** select **Basic configuration 0001**.
- Select **Memory Range**

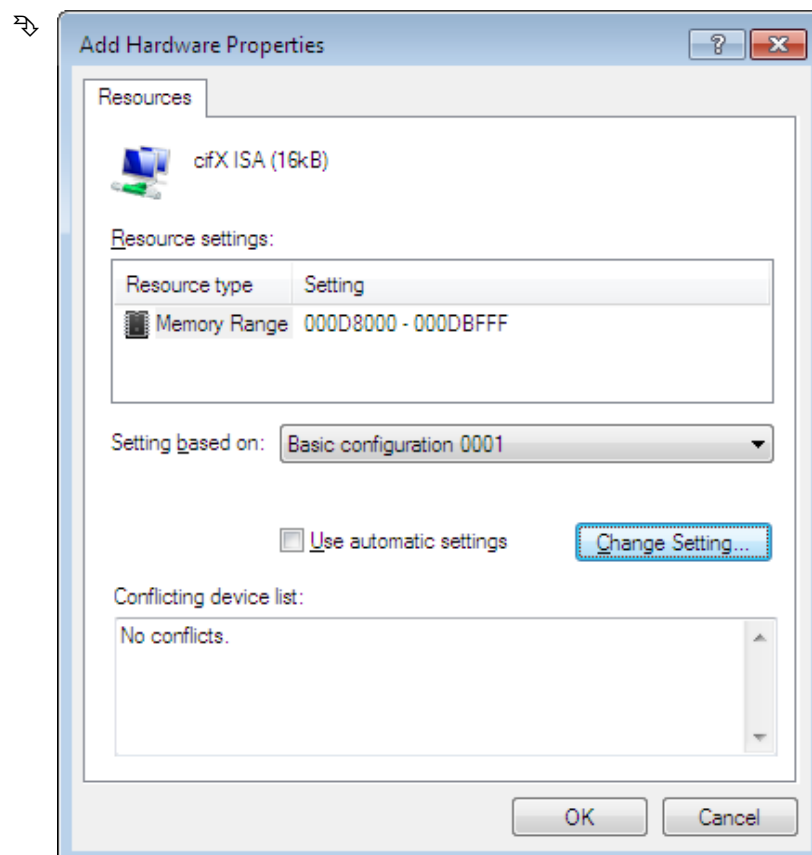


- Click **Change Settings**

- Set the memory address: e. g. address D8000

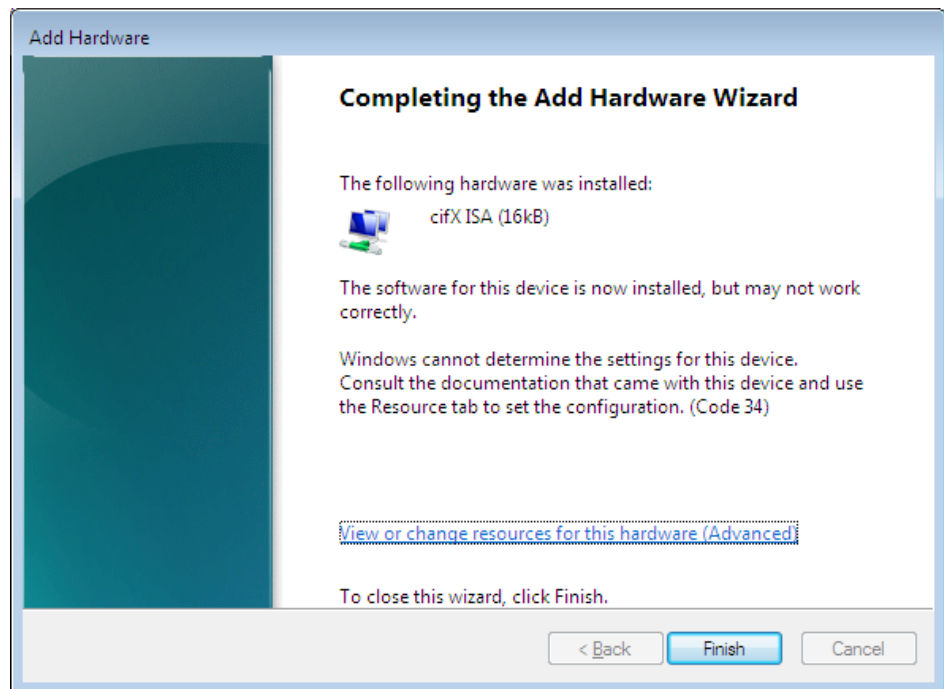


- Click **OK**



- Click **OK**

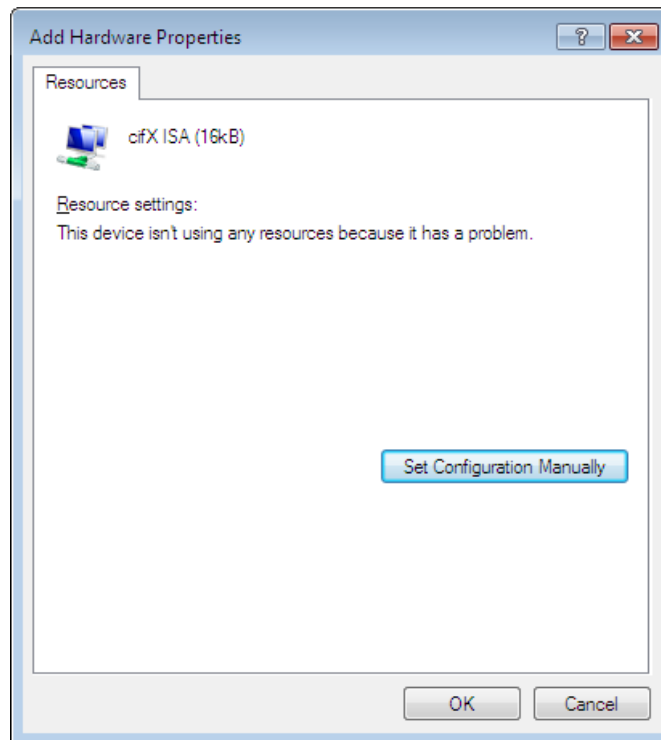
- Click **Finish**.



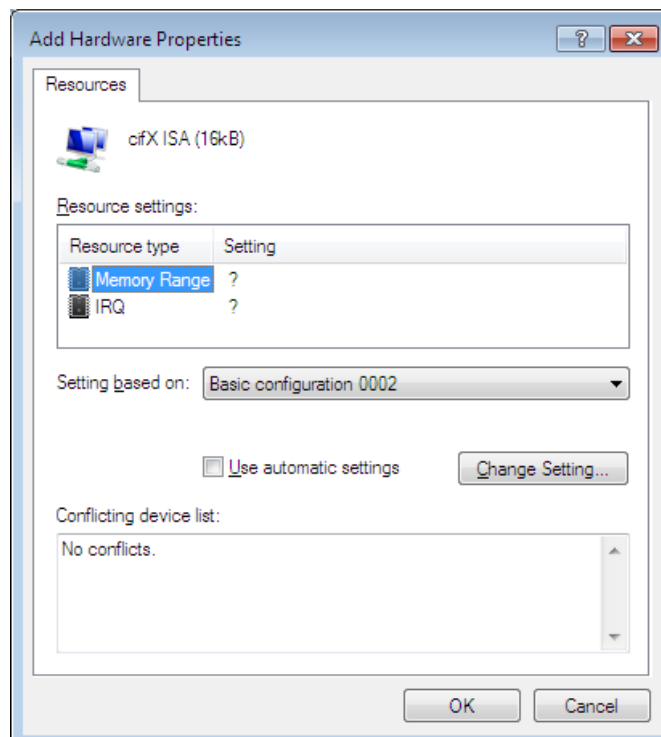
- Restart the PC.

Select Memory Address and interrupt (Basic Configuration 0002)

- Click **Set Configuration Manually**

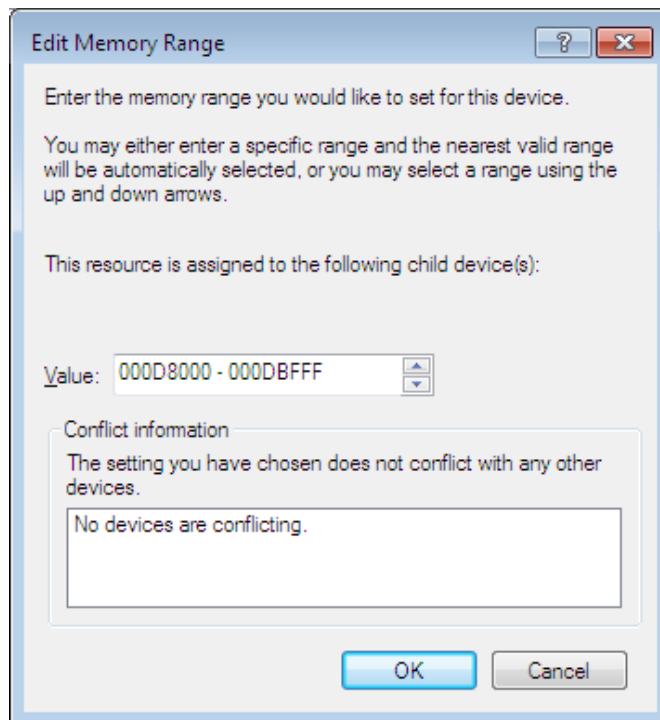


- Uncheck **Use automatic settings**
- At **Settings based on** select **Basic configuration 0002**.
- Select **Memory Range**

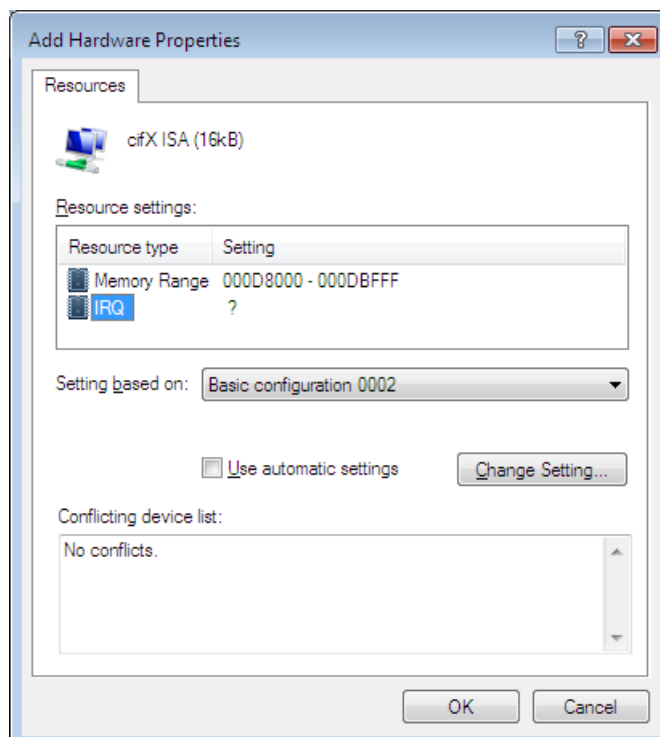


- Click **Change Settings**

- Set the memory address: e. g. address D8000

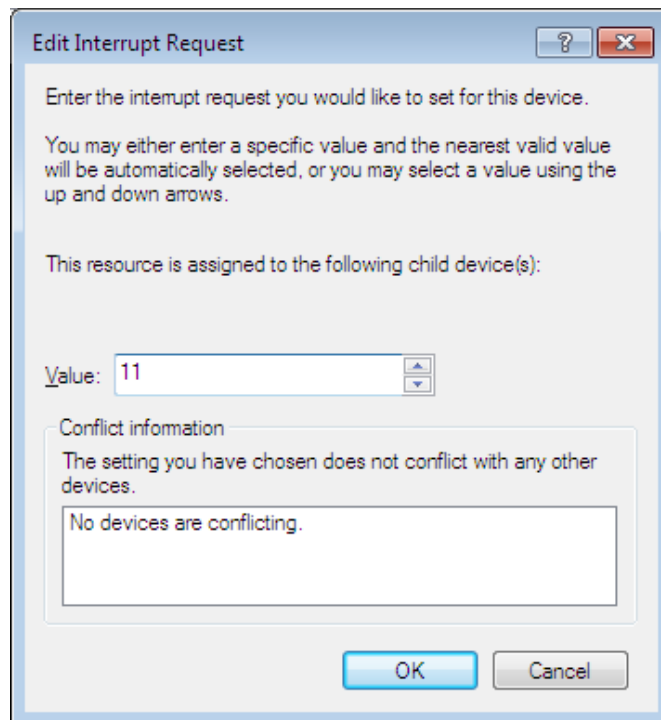


- Click **OK**
- Select **IRQ**

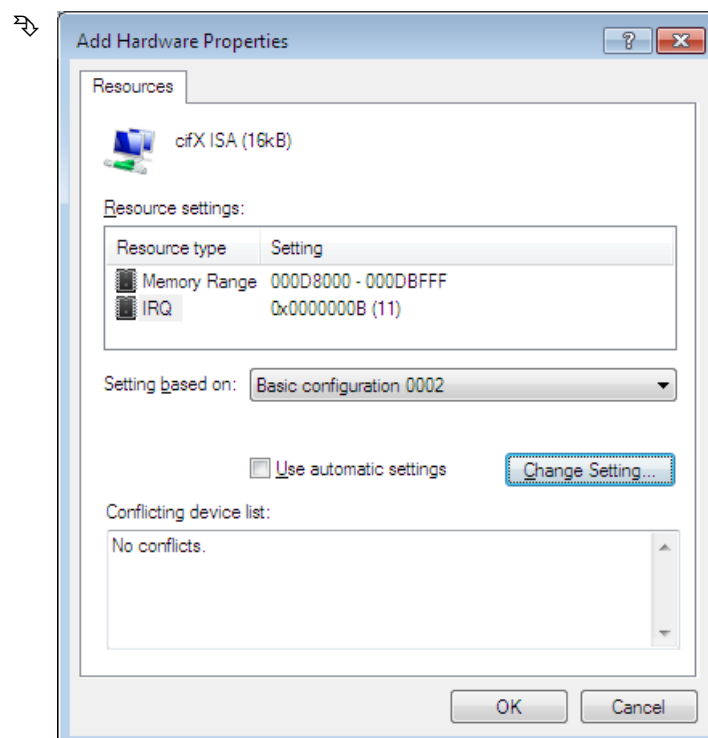


- Click **Change Settings**

- Set the interrupt number: e. g. interrupt 11

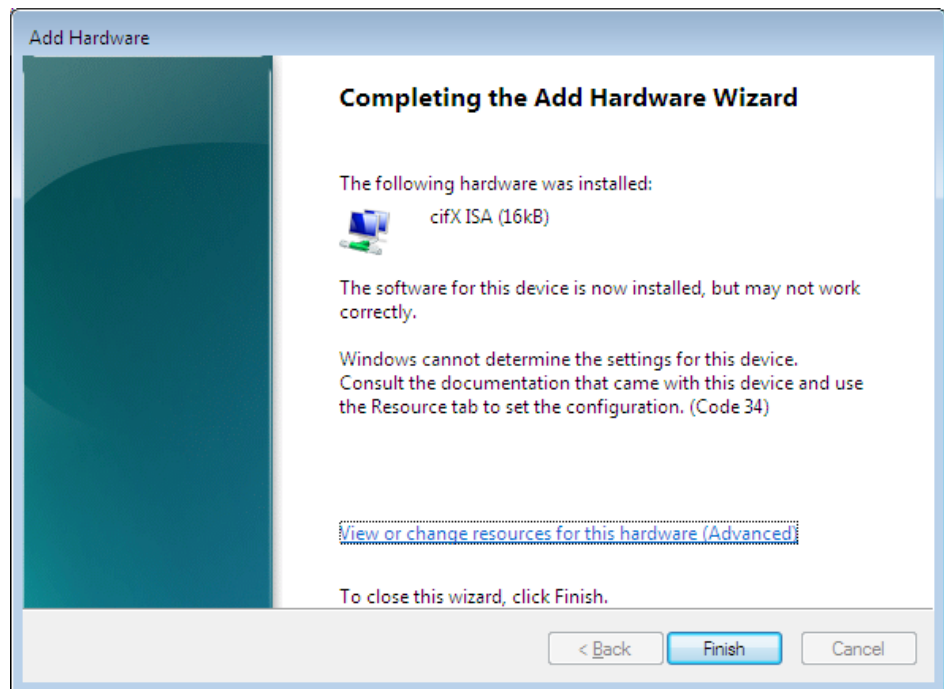


- Click **OK**



- Click **OK**

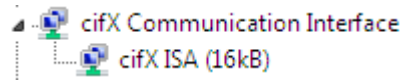
- Click **Finish**.



- Restart the PC.

Check in the Device Manager if the cifX ISA is installed properly

- Open the **Device Manager**.
- Check, if the display in the **Device Manager** shows **cifX ISA (16kB)**



If an exclamation mark is shown with **cifX ISA (16kB)**

- If an exclamation mark is shown with **cifX ISA (16kB)**, then either a resource conflict exists or the requested resources are not available.
- Select from the context menu on **cifX ISA (16kB)** > **Properties**.
- Select the tab **Resources**.
- Change the setting for the memory range respectively the interrupt with **Set Configuration Manually**, as described in section *Select Memory Address for polling (Basic Configuration 0001)* on page 126 or in section *Select Memory Address and interrupt (Basic Configuration 0002)* on page 129.

7.5 Installing the netX Configuration Tool

After the **cifX Device Driver** is installed start the netX Configuration Tool setup program to install the **netX Configuration Tool**:

Therefore:

- Close all application programs on the system!
- Insert the cifX DVD to the local DVD drive.
- Start in the directory **Software** the netX Configuration Tool setup program and execute the installation steps according to the instructions at the screen.

Or:

- Select **netX Configuration Tool** of the autostart menu.

7.5.1 Uninstalling the netX Configuration Tool

To uninstall the **netX Configuration Tool**:

- Select **Start > Control Panel > Software**
- Click **Remove** in the list beside the entry **netX Configuration Tool**.
- Answer the following question with **Yes**.
- The **netX Configuration Tool** will be removed.

7.6 Installing SYCON.net

To install the configuration software **SYCON.net**:

- Close all application programs on the system!
- Insert the cifX CD to the local DVD drive.
- Start in the directory **Software** the SYCON.net setup program *SYCONnet netX setup.exe*.

Or:

- Select **SYCON.net** of the autostart menu.



Note: Administrator privileges are required on Windows® 2000/ Windows® XP systems for installation!

- Choose **System Installation** from the start screen.
- The installation program asks for the components to be installed.
- Answer these questions with **Yes** or **No**.

7.6.1 Steps how to install SYCON.net

1. Language for the setup



Figure 47: SYCON.net Setup Language

- Select the language for the setup
- Click on **OK**.

2. Continue installation

- Click on **Next >** to continue the installation.

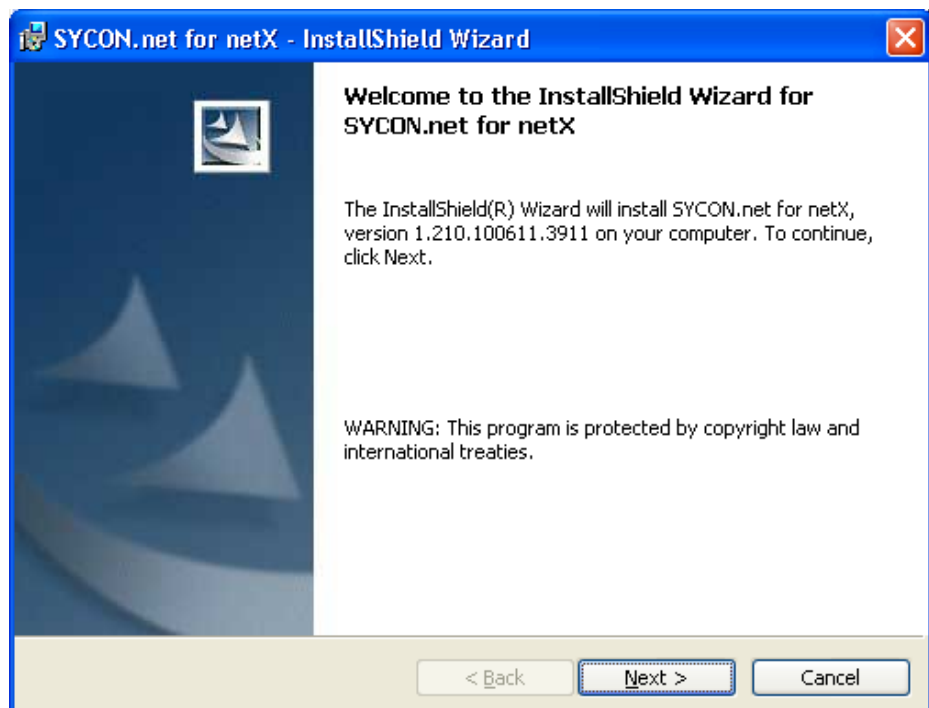


Figure 48: SYCON.net Installation Information

3. Read the notes about major changes in SYCON.net

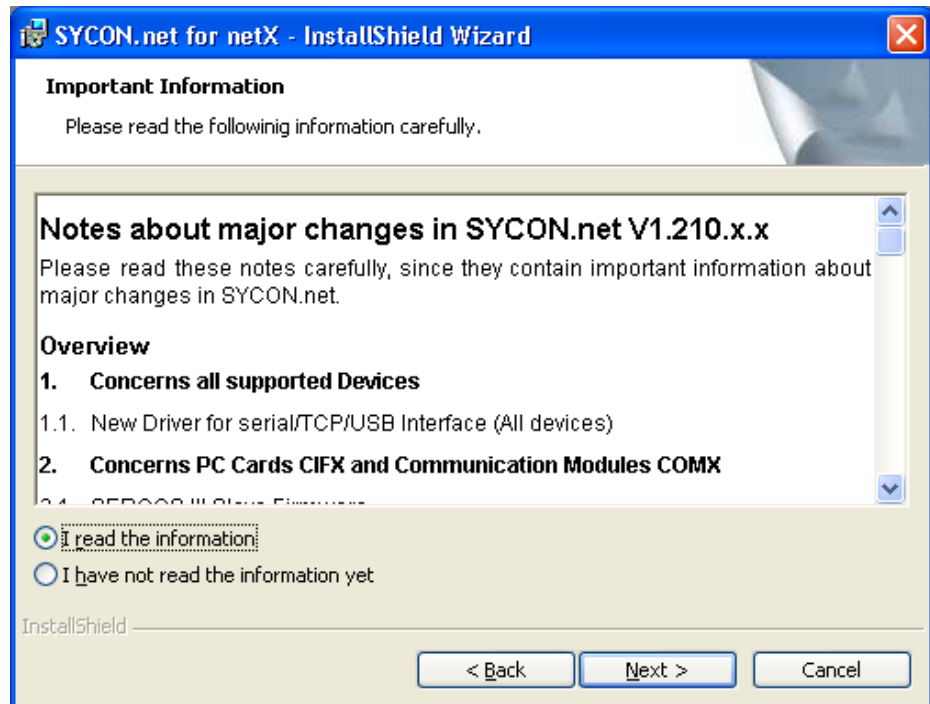


Figure 49: Notes about major changes in SYCON.net

- Read the note about major changes in SYCON.net carefully.
- Select **I read the information**, when you have read them.
- Click on **Next >** to continue the installation.

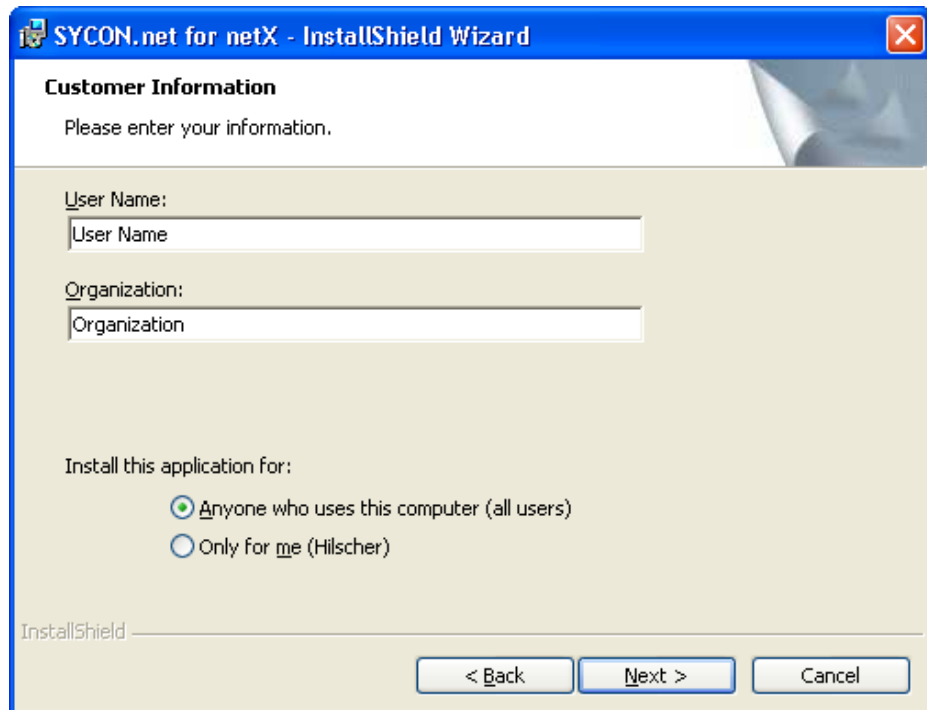
4. Accept license agreement



Figure 50: SYCON.net License Agreement

- Select **I accept the terms in the license agreement**, when you agree to it.
- Click on **Next >** to continue the installation.

5. Enter user information



The image shows a Windows-style installation wizard window titled "SYCON.net for netX - InstallShield Wizard". The window has a blue title bar with a close button in the top right corner. The main content area is titled "Customer Information" and contains the instruction "Please enter your information." Below this, there are two text input fields: "User Name:" and "Organization:". The "User Name:" field contains the text "User Name" and the "Organization:" field contains the text "Organization". Below these fields, there is a section titled "Install this application for:" with two radio button options: "Anyone who uses this computer (all users)" (which is selected) and "Only for me (Hilscher)". At the bottom of the window, there is a status bar that says "InstallShield" and three buttons: "< Back", "Next >", and "Cancel".

Figure 51: SYCON.net Customer Information

- Enter the user name and the name of the organization
- Select the user(s) the software is installed for.
- Click on **Next >** to continue the installation.

6. Select setup type

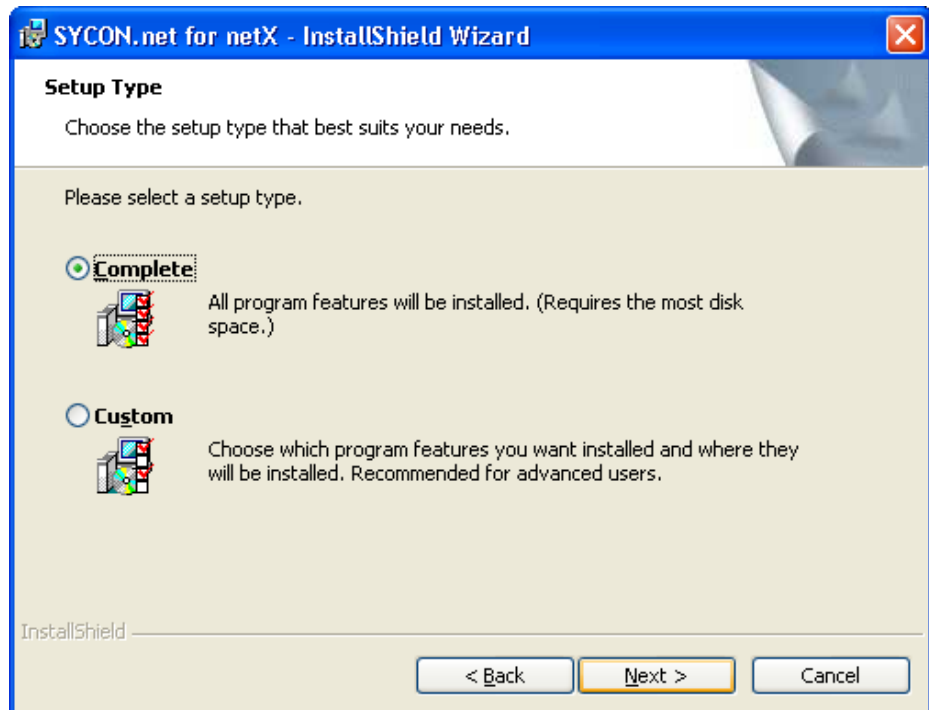


Figure 52: SYCON.net Setup Type

- Select **Complete** when you want to install the complete software.
- Click on **Next >** to continue the installation.

7. Installation

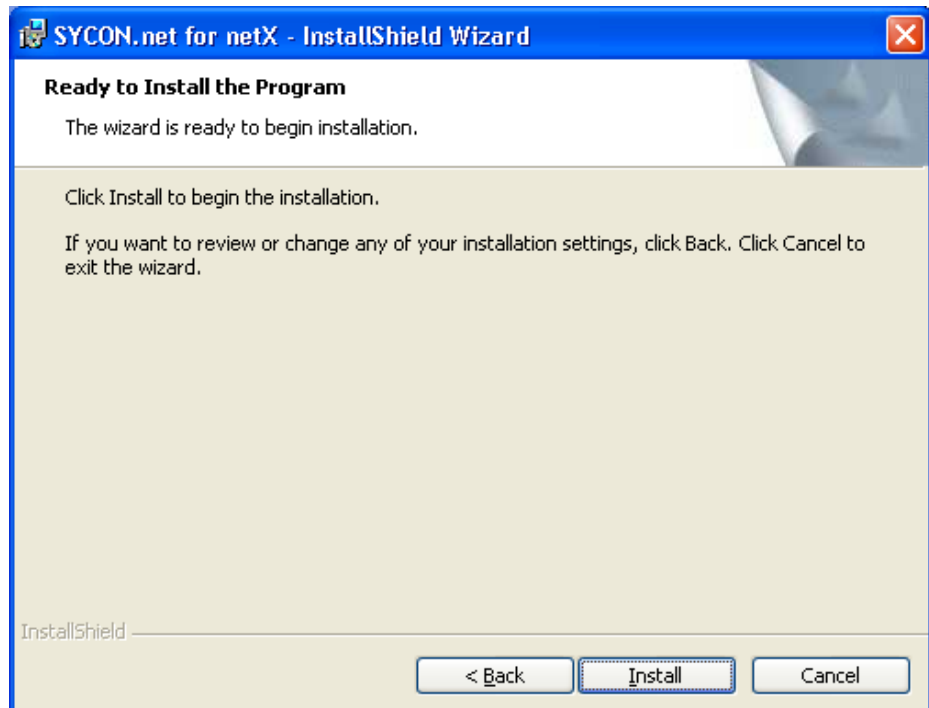


Figure 53: SYCON.net Start Installation

- Click on **Install** to do the installation now.
- The components are installed. This will take several minutes.

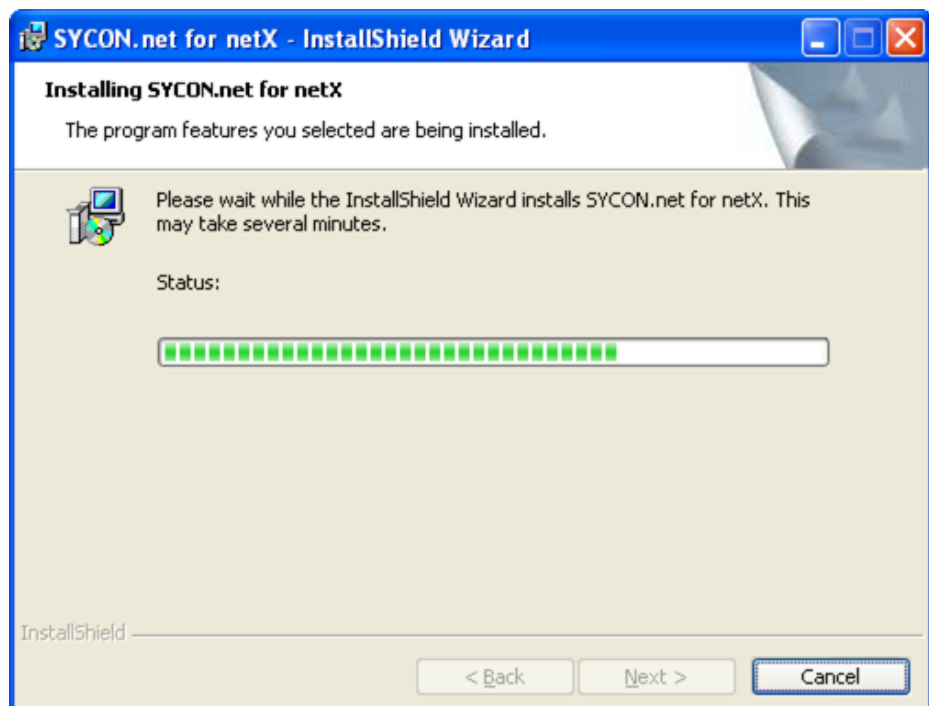


Figure 54: SYCON.net Installation Status

8. Finish installation

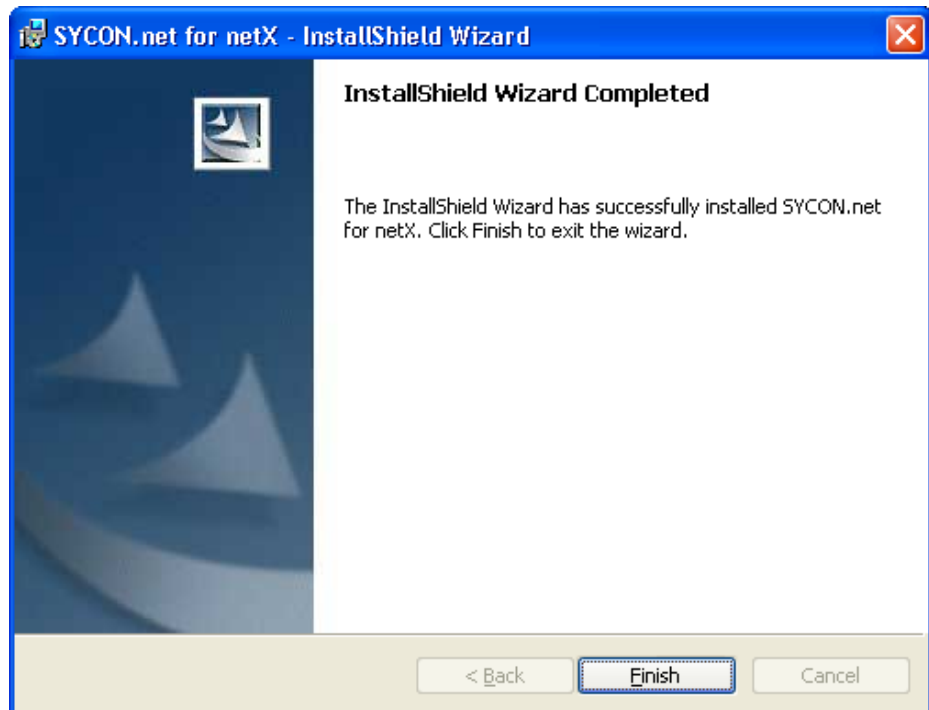


Figure 55: SYCON.net Installation Finish

- Click on **Finish**
- The software is installed.

7.7 Slot Number (Card ID) in the cifX Device Driver Setup

This section describes how the **Slot Number (Card ID)** is displayed in the cifX Device Driver setup program.

Precondition: Previously a **Slot Number (Card ID)** between 1 and 9 has been set at the cifX card (refer to section *Setting Slot Number (Card ID)*, on page 79).

The description below uses for **Slot Number (Card ID)** the value „1“.

1. Open the **cifX Setup** program in the control panel.
 - Select **Start > Control Panel**.
 - Double click on the **cifX Setup** symbol.
 - The cifX Driver setup program starts.
2. Select **cifX**.
 - Select under **Device List > Active Devices** the entry **cifX0** or **cifX1**.
 - The field **Slot Number** shows the **Slot Number (Card ID)** for the cifX card. For this description the **Slot Number (Card ID)** has the value „1“.

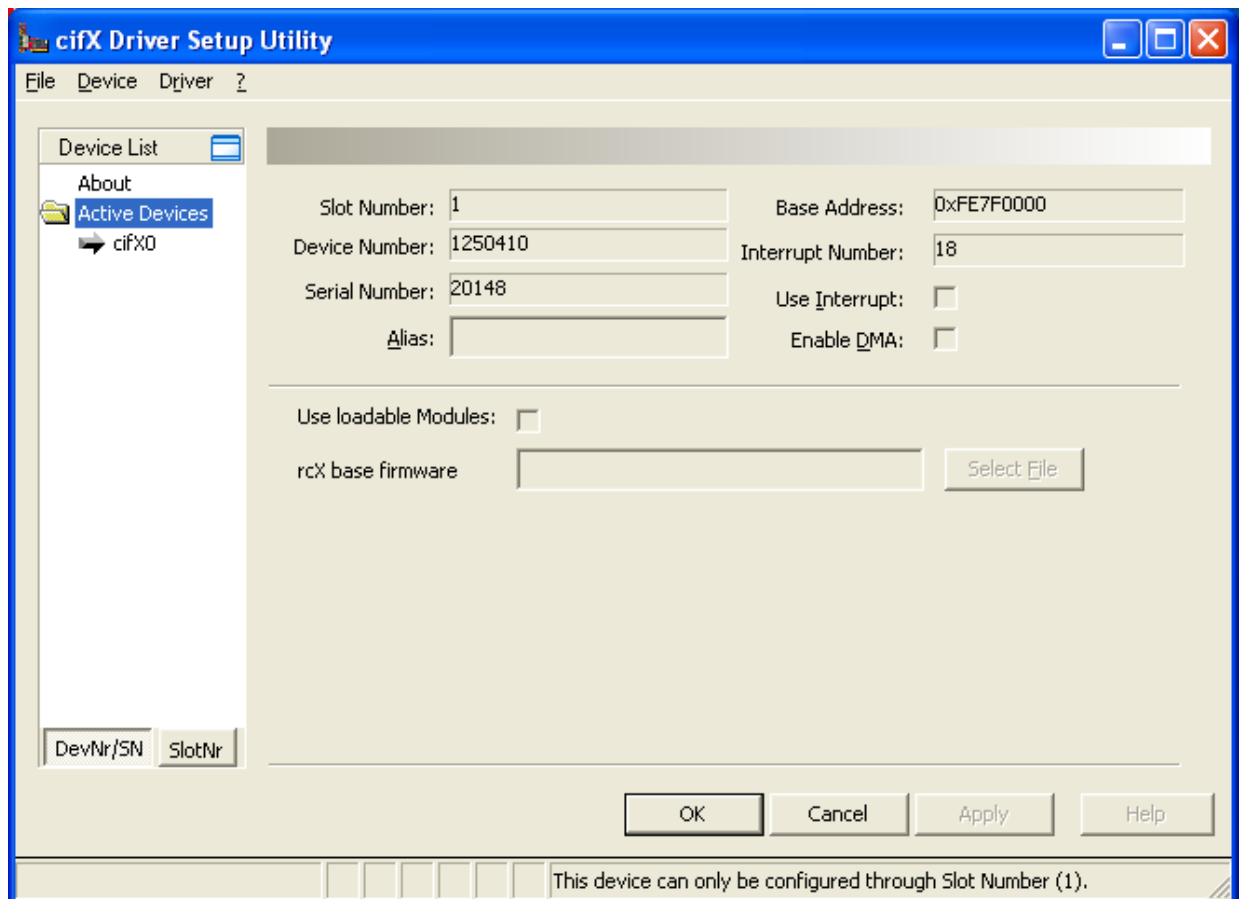


Figure 56: Slot Number (Card ID) in the cifX Device Driver Setup

Oder:

3. Switch to **SlotNr** presentation.

- Click under **Device List** on **SlotNr**.
- Click under **Device List** on **Slot 1**.

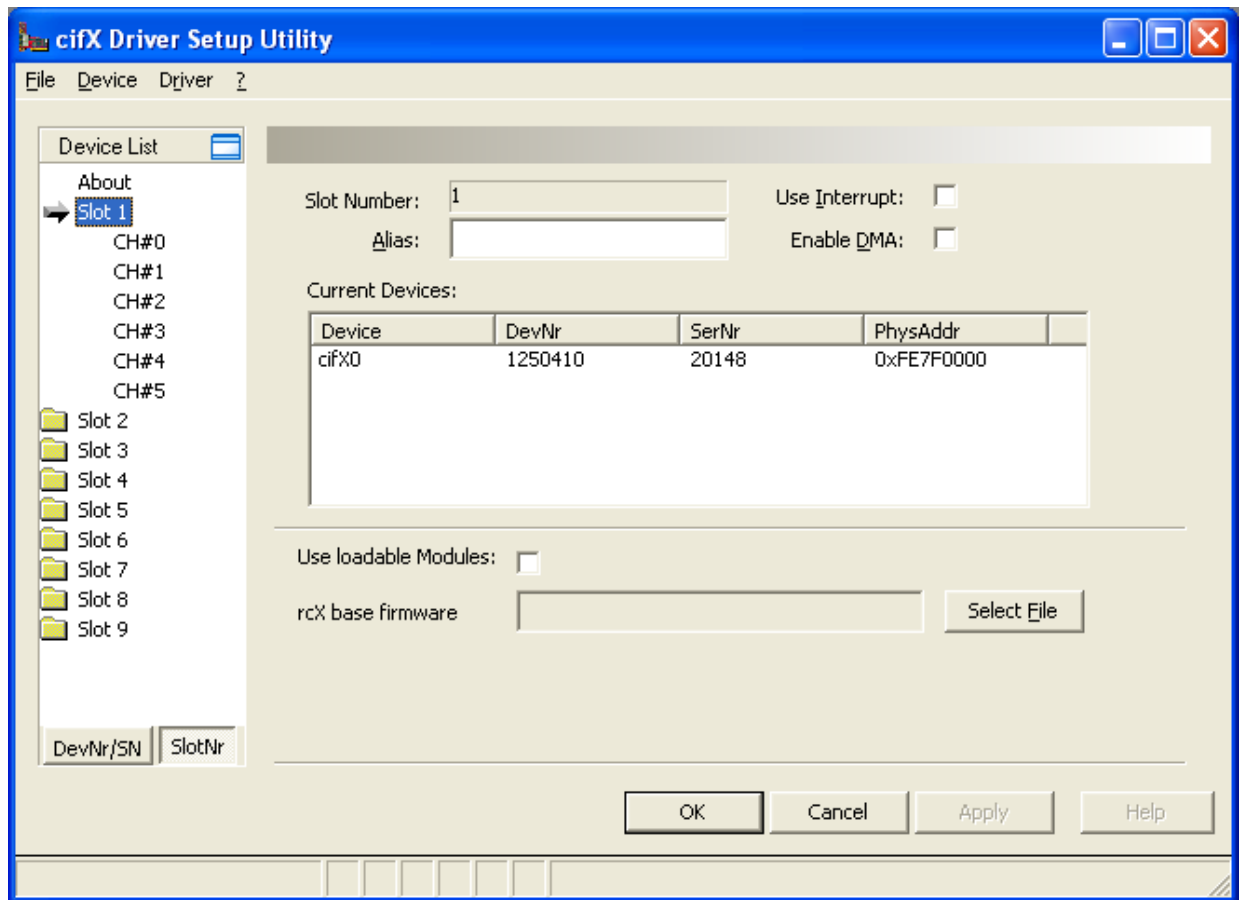


Figure 57: Slot Number (Card ID) in the cifX Device Driver Setup, „SlotNr“ selected

7.8 Activating DMA Mode in the cifX Device Driver Setup

This section describes how to activate the **DMA Mode** in the cifX Device Driver setup program.

Case 1: Previously a **Slot Number (Card ID)** between 1 and 9 has been set at the cifX card (refer to section *Setting Slot Number (Card ID)*, on page 79).

Case 2: Previously the **Slot Number (Card ID)** value 0 has been set at the cifX card or the cifX card is not equipped with a **Rotary Switch Slot Number (Card ID)**.

The description below refers to case 1 and uses for **Slot Number (Card ID)** the value „1“.

1. Switch to **SlotNr** presentation.
 - Click under **Device List** on **SlotNr**.
 - Click under **Device List** on **Slot 1**.
2. Activate **DMA Mode**
 - Check **Enable DMA**.

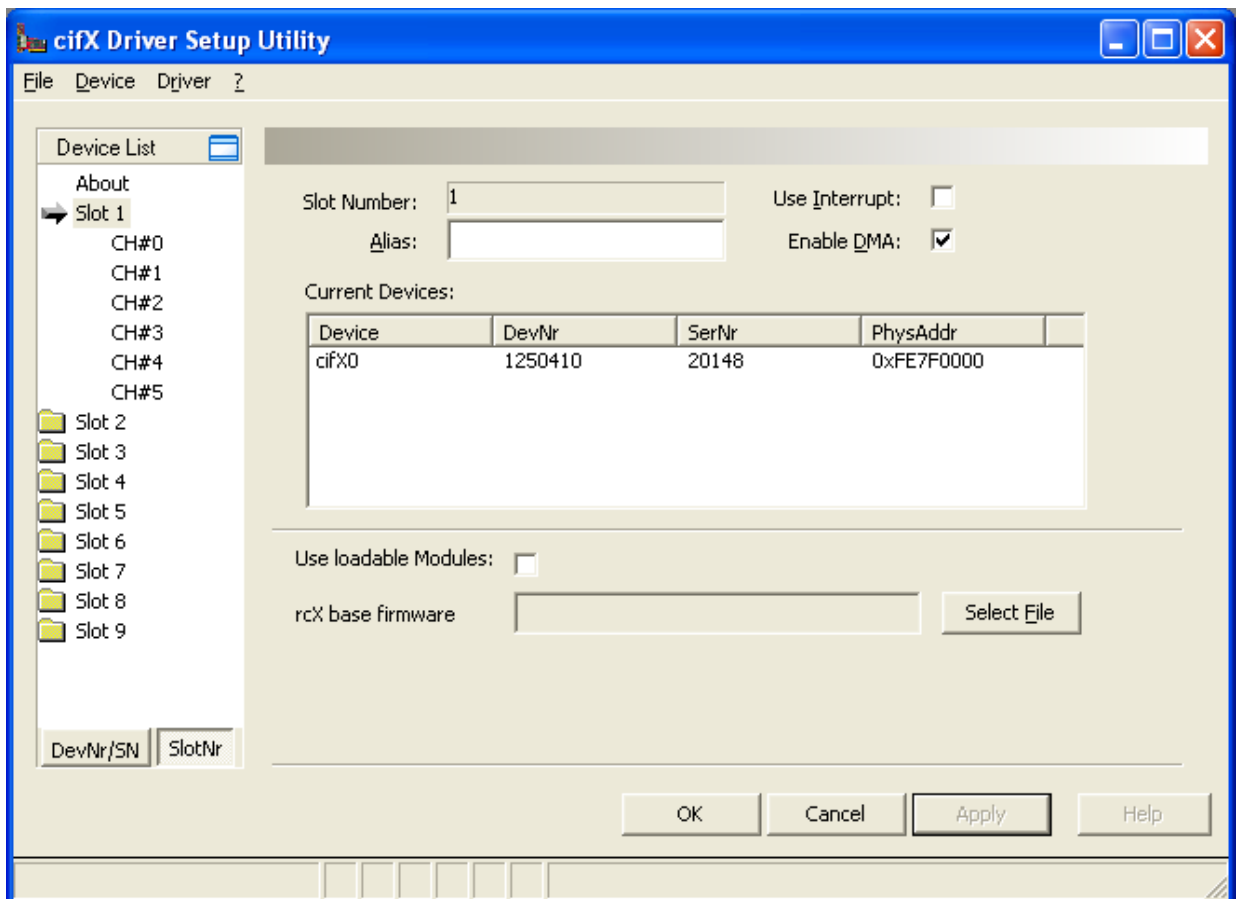


Figure 58: Activating DMA Mode in the cifX Device Driver Setup

3. Apply Settings
 - Click **Apply**
 - The **DMA Mode** is activated.

7.9 Slot Number (Card ID) in the Configuration Software

In the **Device Assignment** in the column **Slot number** the **Slot-Nummer (Card ID)** is displayed preset at the cifX card via the Rotary Switch Slot Number (Card ID).

The indication **n/a** means that no **Slot-Nummer (Card ID)** exists. This occurs, if the cifX card is not equipped with a **Rotary Switch Slot Number (Card ID)** or for cifX cards equipped with a **Rotary Switch Slot Number (Card ID)**, if the rotary switch is set to the value 0 (zero).

	Device	Hardware Port 0/1/2/3	Slot number	Serial number	Driver	Channel Protocol	Access path
☐	CIFX 50-DP	-/-/PROFIBUS/-	n/a	20031	CIFX Device Driver	PROFIBUS-DP Master	...\cifX3_Ch0
☒	CIFX 50-DP	-/-/PROFIBUS/-	1	20148	CIFX Device Driver	PROFIBUS-DP Master	...\cifX0_Ch0

Figure 59: Slot Number (Card ID) in the Device Assignment (Example PROFIBUS)

Parameter	Meaning	Range of Value / Value
Slot number	Shows the Slot Number (Card ID) preset at the cifX card via the Rotary Switch Slot Number (Card ID) . The indication n/a means that no Slot-Nummer (Card ID) exists. This occurs, if the cifX card is not equipped with a Rotary Switch Slot Number (Card ID) or for cifX cards equipped with a Rotary Switch Slot Number (Card ID) , if the rotary switch is set to the value 0 (zero).	1 to 9, n/a

Table 52: Slot Number (Card ID) in the Device Assignment

8 Overview netX Configuration Tool

The chapter **Overview netX Configuration Tool** provides information on how to configure the device parameters of a real-time Ethernet or a fieldbus Slave and what can be read from the diagnostic window.

8.1 Configuration Steps cifX Card

The following table describes the main steps how to configure a netX based device, if the following requirements are fulfilled:

- The device hardware must be installed and operational.
- The **netX Configuration Tool** including the device driver must be installed.

No.	Step	Short Description	For detailed information see section	Page
1	Starting the netX Configuration Tool	➤ Select Start > Programs > Hilscher GmbH > netX Configuration Tool	<i>Working with netX Configuration Tool</i>	155
2	Selecting the Language	➤ Select in the Select Language Icon Bar the language icon for the desired language of the graphical user interface.	<i>Working with netX Configuration Tool</i>	155
3	Selecting the Firmware Protocol	Select in the Select Network Icon Bar the firmware button for the firmware (Slave device) you intend to use with your device. If all firmware symbols are greyed out: ➤ Make sure once more, the device is operational. ➤ Right click to the navigation area. ➤ Select the context menu Reload , to reestablish a connection to the device.	<i>Working with netX Configuration Tool</i> <i>Reload</i>	155 150
4	Setting the Parameters	Click in the navigation area to the Configuration push button. ➤ Set the configuration parameters for the Slave to be used. If you are not sure about the meaning of a single configuration parameter, we recommend to read the respective documentation or to choose the default value.	<i>Working with netX Configuration Tool</i> <i>Configuring Slave Devices using netX Configuration Tool</i>	155 165
5	Downloading and save the Firmware and the Configuration	➤ Click to Apply . The firmware and the configuration are downloaded to the device. The configuration is saved to the hard disk.	<i>Working with netX Configuration Tool</i>	155
6	Starting the Communication and checking the Diagnostic Data	➤ Click to Diagnostic in the navigation area. ➤ Click to Start . The communication to the Master is started. ➤ Check the device communication with help of the displayed diagnostic data. Open the extended Diagnostic pane: ➤ Click Extended >> .	<i>Diagnostic Dialog</i> <i>'Extended' Diagnosis</i>	190 194
7	How to quit the netX Configuration Tool	➤ Select the button OK or Cancel to quit the netX Configuration Tool .	<i>Working with netX Configuration Tool</i>	155

Table 53: netX Configuration Tool Configuration Steps

8.2 Starting netX Configuration Tool

1. Make sure the device is correctly supplied with power and is operational.
2. Start the **netX Configuration Tool**.
 - Select **Start > Programs > Hilscher GmbH > netX Configuration Tool**.

8.3 Introduction to the Dialog Structure

The graphical user interface of the **netX Configuration Tool** is composed of different areas and elements listed hereafter:

1. A header area containing the **Select Network and Language Bar** and the **Device Identification**,
2. The **Navigation Area** (area on the left side) including the menu buttons **Configuration**, **Diagnostic** and **IO Monitor** and depending on the device additional menu buttons (at the lower side of the navigation area),
3. The **Dialog Pane** (main area on the right side),
4. The general buttons **OK**, **Cancel**, **Apply**, **Help**,
5. The **Status Bar** containing information e. g. the online-state of the **netX Configuration Tool**.

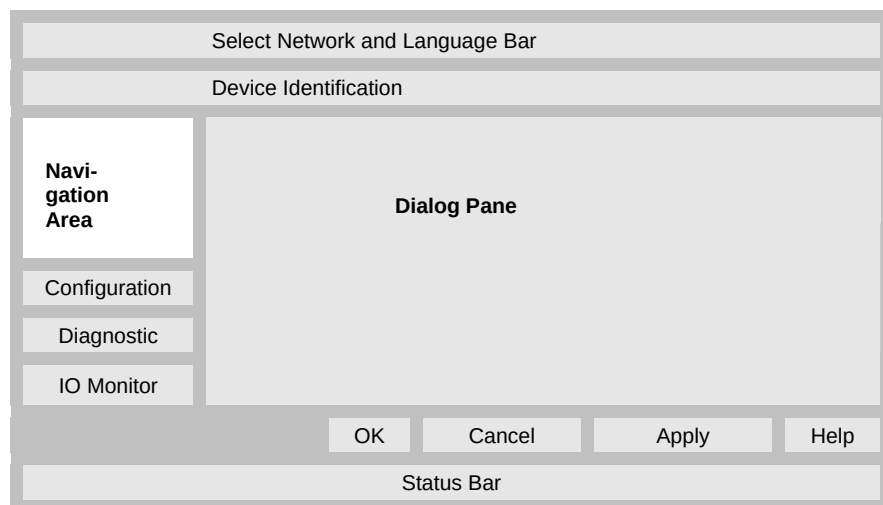


Figure 60: Dialog Structure of **netX Configuration Tool**

8.3.1 Select Network/Language Icon Bar and Device Identification

Select Network Icon Bar



Fieldbus device is connected



Ethernet device is connected

Figure 61: Select Network Icon Bar (Example)

Language Icon Bar



Figure 62: Select Language Icon Bar
(only English and German yet)

Device Identification

The **Device Identification** shows the information about the connected device.

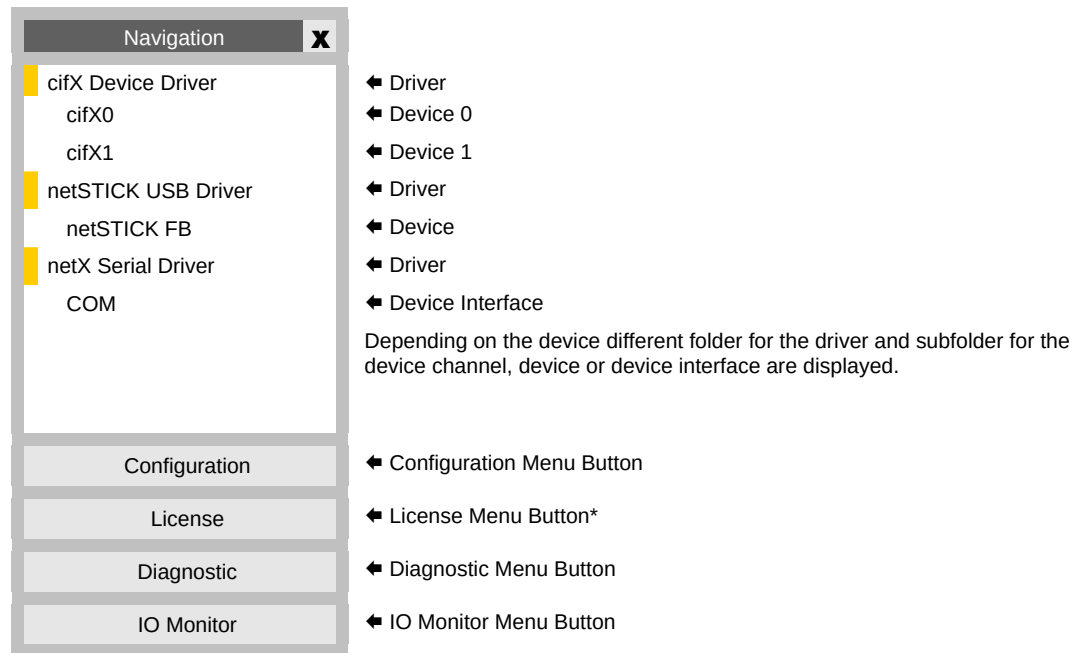
Parameter	Meaning
IO Device	Name of the device
Vendor	Vendor name of the device
HW Device ID	Identification number of the hardware device
HW Vendor ID	Identification number of the hardware vendor
Firmware	Name of the currently loaded firmware
Version	Version of the currently loaded firmware

Table 54: Device Identification

8.3.2 Navigation Area

The **Navigation Area** at the left side of the **netX Configuration Tool** shows:

- the installed drivers and devices as a folder structure (at the upper side of the navigation area),
- the menu buttons **Configuration** and **Diagnostic** and depending on the device additional menu buttons (at the lower side of the navigation area). This menu buttons give access to the dialog panes **Configuration** and **Diagnostic** and depending on the device further panes.



*Depending on the device this menu button is displayed or not.

Figure 63: Navigation Area - Example



Note: The scope of functions of the **netX Configuration Tool** depends from the installation setup used. Therefore depending on the device the displayed navigation folders and menu buttons may differ from the example given here.

Reload

If the netX Configuration Tool is not connected to the device:

- Make sure once more, the device is operational.

Then reestablish a connection to the device:

- Right click to the navigation area.
- Select the context menu **Reload**.

Hide/display Navigation

The **Navigation Area** can be hidden or it can be displayed again.

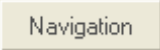
Control	Meaning
	Window button to hide the navigation area, (at the right side of the navigation title bar).
	Navigation button to open the navigation area, (at the lower left corner of the dialog pane).

Table 55: Hide/display Navigation

8.3.3 Dialog Pane

At the dialog pane the configuration or the diagnostic panes are opened via the corresponding Menu Button in the navigation area.

Configuration	
	In the Configuration pane the parameters of the currently loaded firmware are displayed and can be edited there, provided that a firmware has already been loaded. For further information see section <i>Configuring Slave Devices</i> using netX Configuration Tool on page 165.
License	
	In the License pane you can order and download licenses for Master protocols or utilities. For further information see section <i>License</i> on page 158.
Diagnostic, IO Monitor	
	In the Diagnostic pane diagnosis information can be displayed. Via Start and Stop the communication to the Master device can be started or stopped. For further information see section <i>Diagnostic Dialog</i> on page 190 and section <i>'Extended' Diagnosis</i> on page 194.
	Also the IO Monitor is provided for test and diagnosis purposes. For further information, refer to section <i>IO Monitor</i> on page 218.

Table 56: Overview Dialog Panes

8.3.4 General Buttons

The table below explains the general buttons and controls in the **netX Configuration Tool** user interface.

Button	Meaning
OK	If the firmware or the configuration has <u>not</u> been changed and you click to the OK button, the netX Configuration Tool is closed. If the firmware or the configuration has been changed and you click to the OK button, the request is displayed Do you want to download the new firmware and the new configuration on the device? ➤ Select the Yes button, if you want to download the firmware/configuration directly to the device and then quit the netX Configuration Tool. The configuration is saved to the hard disk of the PC. Or ➤ Select the No button, if you want to quit the netX Configuration Tool. Or ➤ Select the Cancel button, if you want to cancel the procedure and to return to the main pane.
Cancel	If the firmware or the configuration has been changed and you click to the Cancel button, the request is displayed The configuration was changed. Do you want to save it before closing the application? ➤ Select the Yes button, if you want to save the configuration. The configuration will be saved to the hard disk of the PC but it is not downloaded to the device. Or ➤ Select the No button, if you want to quit the netX Configuration Tool.
Apply	If the firmware or the configuration has <u>not</u> been changed and the offline and the online configuration are identical the Apply button is grayed out. If the firmware or the configuration has been changed and you click to the Apply button, the request is displayed Do you want to download the new firmware and the new configuration on the device? ➤ Select the Yes button, if you want to download the firmware/configuration directly to the device. The configuration is saved to the hard disk of the PC. Or ➤ Select the Cancel button, if you want to cancel the procedure and to return to the main pane.
Help	To open the netX Configuration Tool online help, click on the Help button.
Default	To reset the parameters to the default state, click the Default button in the configuration pane.
Enable	If 'Enabled' is unchecked, the default value is used.

Table 57: General Buttons and Controls

8.3.5 Status Bar

The **Status Bar** displays information about the current state of the **netX Configuration Tool**. The current activity, e.g. download, is signaled graphically via icons in the status bar. Furthermore the status message and the tool version are displayed here.

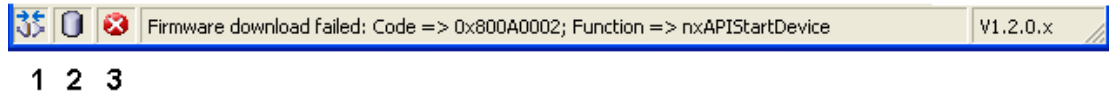


Figure 64: Status Bar: Status Fields 1 to 3, Status Messages, Version

Status Field	Icon/Meaning	
1	DTM Connection States	
		Connecting: Icon going closed = Device is going online
		Connected: Icon closed = Device is online
		Disconnected: Icon opened = Device is offline
2	Data Source States	
		Data set: The displayed data are read out from the instance data set (database).
		Valid Modified: Parameter is changed (not equal to data source).
3	Device Diagnosis Status	
		Save operation succeeded: The save operation has been successful.
		Further messages due to successful handling of device data.
		Off-specification: The device is operating outside its specified range or internal diagnosis indicates deviations from measured or set values due to internal problems in the device or process characteristics.
		Save operation failed: The save operation has failed.
		Further fail operation messages due to incorrect communication due to malfunction in the field device or its peripherals.

Table 58: Status Bar Icons

8.4 Working with netX Configuration Tool

To work with the **netX Configuration Tool** follow the steps described hereafter:

1. Make sure the device is correctly supplied with power and is operational.
2. Start the **netX Configuration Tool**:
 - Select **Start > Programs > Hilscher GmbH > netX Configuration Tool**.

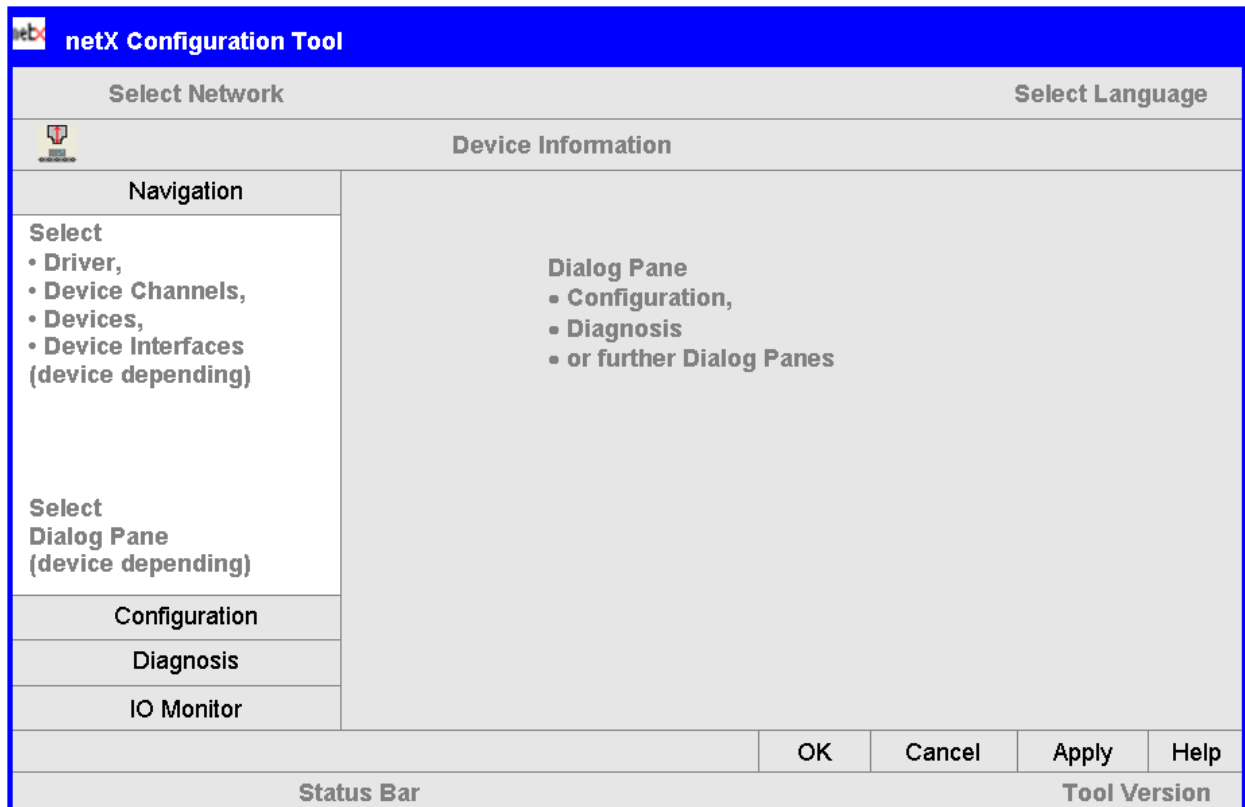


Figure 65: **netX Configuration Tool** – Comments to the User Interface

- After the **netX Configuration Tool** has been started, the **Select Network/Language Icon Bar** is activated. The **Device Identification** shows the information about the connected device.



Note: - device dependent -

1. If, in the navigation area, the folder **netX Serial Driver/COMx** is selected, the firmware and the device are requested via the serial interface and displayed. The corresponding firmware button is activated automatically. The device pane is activated and updated online.
2. In the **Select Network Icon Bar** some firmware buttons will only be displayed depending by the device.

3. Select the Language:

- Select in the **Select Language Icon Bar** the language icon for the language in which the graphical user interface shall be displayed.

Icon	Language
	German
	English
	French
	Japanese

Table 59: Select Language Icon Bar
(currently English and German)

- The graphical user interface of the **netX Configuration Tool** is displayed in the corresponding language.

4. Select the Firmware Protocol:

- Select in the **Select Network Icon Bar** the button for the Slave device firmware required for your device.

Fieldbus		Real-Time Ethernet	
Firmware Button	Firmware	Firmware Button	Firmware
	PROFIBUS DP-Slave		PROFINET IO-Device
	CANopen Slave		EtherCAT-Slave
	DeviceNet Slave		EtherNet/IP-Adapter (Slave)
	CompoNet Slave		Open Modbus/TCP
	CC-Link Slave		SERCOS III Slave
			Powerlink Controlled Node/Slave

Table 60: Select Network Icon Bar: Firmware Fieldbus Buttons and Real-Time Ethernet System

If all firmware symbols in the **Select Network Icon Bar** are greyed out, the **netX Configuration Tool** is not connected to the device:

- In this case make sure once more, the device is operational.

Then reestablish a connection to the device:

- Right click to the navigation area.
- Select the context menu **Reload**.

5. Set Parameters:

- Click in the navigation area on the **Configuration** button to open the **Configuration** pane.
- Set the parameters in the **Configuration** pane.

6. Download the Firmware and the Configuration:

- Click the **Apply** button.
- The selected firmware and the configuration are directly downloaded to the device. The configuration is saved to the hard disk of the PC. The download is signaled:
 - In the status bar successively the messages are displayed: „Firmware download started“, „Configuration download started“, „Configuration download succeeded“.
 - The corresponding progress bar is displayed.

7. Starting the Communication and checking the Diagnostic Data

- Click in the navigation area to the **Diagnostic** button to open the **Diagnostic** pane.
- Click on **Start** to start the communication to the Master device.
- Check the device communication with help of the displayed diagnostic data.

8. How to quit the **netX Configuration Tool**

- Select the button **OK** or **Cancel** to quit the **netX Configuration Tool**.



For further information refer to the chapter *Configuring Slave Devices using netX Configuration Tool* on page 165, to the section *General Buttons* on page 153 and to section *Diagnostic Dialog* on page 190 and to section *'Extended' Diagnosis* on page 194.

8.5 License

In the **License** pane you can:

- check, which licenses are present in the device,
- order licenses,
- transfer license files to the device.

License

License

	Existing	Order
Master protocols		
1 General Master License	NO	☐
2 General Master Licenses	NO	☐
AS-Interface Master	YES	☒
CANopen Master	YES	☒
EtherCat Master	YES	☒
EtherNet/IP Scanner	YES	☒
PROFINET IO RT Controller	YES	☒
DeviceNet Master	YES	☒
Utilities		
OPC Server	NO	☐
SYCON.net	YES	☒
QVis	NO	☐
CoDeSys	NO	☐

Name	Value
License type	User Single Device License
Manufacturer*	0x0001
Article number*	1250100
Serial number*	20261
Chiptype*	-
Step*	-
Romcode revision*	-

Fields marked with * are mandatory.

[Subsidiary] [E-Mail address, to which the license download link shall be send.]

[Fax number for license ordering]

[Telephone number for license ordering]

Figure 66: License Pane

8.5.1 Which licenses are present in the Device?

Check in the **License** pane which licenses are present in the device.

- Therefore click to the **Master Protocols** or **Utilities** folder to expand it.
- The column **Existing** indicates which licenses are present in the device.

License for Protocols

1 General Master License.

On the device maximally 1 communication protocol with master function can be implemented.

2 General Master Licenses.

On the device maximally 2 communication protocols with master function can be implemented.

License for Utilities

SYCON.net, OPC Server, QVis or CoDeSys

8.5.2 How to order a license

To order a license proceed as follows:

- Select the required licenses,
- Enter the ordering data and
- Send your order via E Mail, Fax or Telephone.

8.5.2.1 Selecting the License

1. Open the **License** pane:

- Click in the **Navigation Area** to the **License** push button to open the **License** pane.

In the **License** pane:

2. Under **License** click to the **Master Protocols** folder to expand it.
3. In the column **Order** check the checkbox for the desired number of licenses:
1 General Master License or 2 General Master Licenses.

And/Or:

4. Under **License** click to the **Utilies** folder to expand it.
5. In the column **Order** check the checkbox for:
SYCON.net, OPC Server, QVis or CoDeSys.

8.5.2.2 Entering the Order Data

1. In the **License** pane under **Name** enter any obligatory order data.
2. Select in the list field **[subsidiary]** the entry for the subsidiary to which the order shall be send.

Device Data (order data read from the device)

The following order data read from the device are displayed in the **License** pane:

- Manufacturer
- Device number
- Serial number
- Chiptype
- Step (chip revision)
- Romcode revision
- Checksum (checksum of the device data)

Data to manage the Order

Mandatory data to the order request (editable fields in the **License** pane):

- Licensetype (User Single Device License):
- First Name
- Surname
- E Mail (E-Mail address, to which the license download link shall be send.)
- Telephone
- Fax
- Company
- Adresse
- Country
- City, State, Zip

Additional order data, not mandatory (editable fields in the **License** pane):

- Order number
- Value added tax identification number

8.5.2.3 Ordering the License by E Mail

- Click to the button **E Mail**.
- ⇒ A prepared ordering E Mail **License request** is opened, to the E Mail address of the subsidiary, to which the order shall be send.
- ⇒ This ordering E Mail contains the automatically generated file *EmailOrderRequest_[Devicenumber]_[Serialnumber].xml* with a summary info of the order information.

[E mail address subsidiary]
License request
 EmailOrderRequest_01712180_00020016.xml (5 KB)

```

=====
netX License Order
=====
[Address data subsidiary]
Licensee Information
-----
First Name:      Hans
Surname:         Mustermann
e-Mail:          mustermann@musterfirma.com
Telephone:       004971156678
Fax:             0049711566790
Company:         Musterfirma
Address:         Musterstrasse 7
Country:         Deutschland
City Zip:        67000
Order Number:
Tax Ident. Number:

License Type
-----
User Single Device License

Device Information
-----
Manufacturer:    00000001
Device Number:   01712180
Serial Number:   00020016
Chip Type:       00000002
Step:            00000000
Romcode Revision: 00000002

Ordered Licenses
-----
Master Protocols:

> 1 General Master License
> AS-Interface Master
> CANopen Master
> EtherCat Master
> EtherNet/IP Scanner
> PROFIBUS Master
> PROFINET IO RT Controller
> DeviceNet Master

Utilities:

> SYCON.net
  
```

Figure 67: Example: ordering E Mail License request

- Send the ordering E Mail **License request**.
- ⇒ The order process is complete.

8.5.2.4 Or ordering the License by Fax or by Telephone:

- Click to the button **Print Fax Form** or **Telephone**.



Note: If your browser does not display the order data or the window **Move Element** or **Copy Element** are displayed, check the safety settings of your system.

- The summary of the ordering data *PrintOrderRequest_[Devicenumber]_[Serialnumber].html* **netX License Order Form** is opened in a browser window.

netX License Order Form

[Address data subsidiary]

Licensee Information

First Name:	Hans
Surname:	Mustermann
e-Mail:	mustermann@musterfirma.com
Telephone:	004971156678
Fax:	0049711566790
Company:	Musterfirma
Address:	Musterstrasse 7
Country:	Deutschland
City Zip:	67000
Order Number:	
Tax Ident. Number:	

License Type

User Single Device License

Device Information

Manufacturer:	00000001
Device Number:	01712180
Serial Number:	00020016
Chip Type:	00000002
Step:	00000000
Romcode Revision:	00000002

Ordered Licenses

Master Protocols

- 1 General MasterLicense
- AS-Interface Master
- CANopen Master
- EtherCat Master
- EtherNet/IP Scanner
- PROFIBUS Master
- PROFINET I/O RT Controller
- DeviceNet Master

Utilities

- SYCON.net

Date: _____

Signature: _____

Figure 68: Example: order data form netX License Order Form

- Print out the order data form **netX License Order Form** and send it by fax.
- Or:
- Keep ready the order data form and communicate the order data via telephone.
 - The order process is complete.

8.5.3 How to get the License and transfer it to the Device

Licenses are delivered as license files.



Note: License files can only be delivered via E Mail.

- The license file is delivered via E Mail. The E Mail contains a link to download the license file.

After the license file has been delivered you transfer the received license file into the device.

1. Download the license file **.nxf* to your system.
 - Therefore open the E Mail.
 - Click to the **Link for the Download of the license file** and download it to your system.
2. Transfer the license file **.nxf* to the device.
 - In the **License** pane click to the button **Download License**.
 - In the file selection window **Open** select the license file *netX License Files (*.nxf)* and click to the button **Open**.
 - Then the license is present in the device and will be activated at the next reset of the device.

9 Configuring Slave Devices using netX Configuration Tool

The current parameters of the selected firmware protocol are displayed in the **Configuration** pane. The configuration parameters can be edited.

- Click in the navigation area to the **Configuration** button to open the **Configuration** pane.

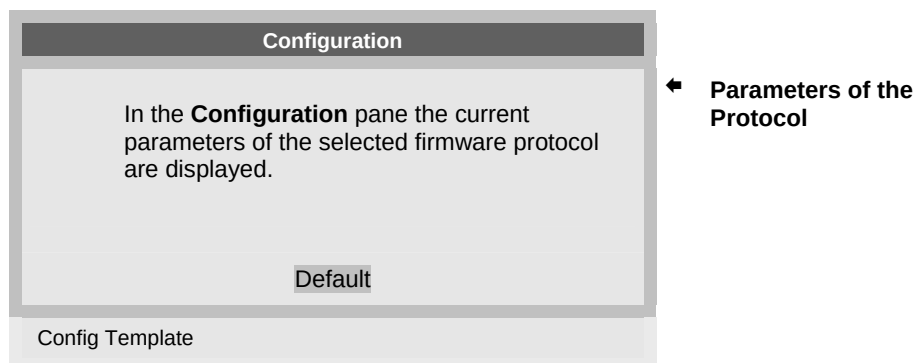


Figure 69: Configuration Pane

The window **Configuration** is described separately for each protocol. Therefor refer to the overview in the section *Overview Configuration Parameters* on page 168.

9.1 Details on Configuration

Default

With the **Default** button the parameters can be reset to the default state.

Enable

If 'Enabled' is unchecked, the default value is used.

Error during Data Input

Error	Action
Parameter validation error! Input field cannot be empty.	Enter data.
Input validation error! Input field accepts only digits.	Enter only digits.
Input validation error! Input field accepts only digits and letters from A to F.	Enter only digits and letters from A to F.

Table 61: Error during Data Input

Configuration Template

Create new Configuration Template:

- In the field **Config Template**  enter a name for the new configuration template.
- Select .
- The settings in the **Configuration** window are saved in the new configuration template in a template XML file.

The XML files are *cifX_Templates.xml*, *netIC_Templates.xml* or *nxstk_Templates.xml* on the PC in the directory *Application Data \ Hilscher GmbH \ netX Configuration Tool \ Project*.

Open Configuration Template:

To access to the configuration settings stored in the configuration template the appropriate configuration template must be opened.

- Select the required configuration template via .
- All settings stored in the configuration template are displayed in the window **Configuration** and can be applied.

Change Configuration Template:

- Open the required configuration template via .
- Adjust the settings in the **configuration** window.
- Select .
- ⇒ The changes of the configuration template are saved.

Delete Configuration Template:

- Open the configuration template to be deleted via .
- Select .
- ⇒ The configuration template is deleted.

Field / Button	Meaning
 Type name here...	Field to enter the name for the template configuration
	Saving the configuration template.
	Selecting a configuration template.
	Deleting a configuration template.

Table 62: Config Template

9.2 Overview Configuration Parameters



Any **Parameters of the Protocol** are described in the subsections listed in the table hereafter.

Section	Subsection	Page
<i>Configuration Parameters Real-Time Ethernet Systems</i>	<i>EtherCAT Slave Parameters</i>	<i>169</i>
	<i>EtherNet/IP Adapter Parameters</i>	<i>171</i>
	<i>Open Modbus/TCP Parameters</i>	<i>174</i>
	<i>Powerlink Controlled Node/Slave Parameters</i>	<i>183</i>
	<i>PROFINET IO-Device Parameters</i>	<i>185</i>
	<i>SERCOS III Slave Parameters</i>	<i>187</i>

Table 63: Descriptions Configuration Parameters Real-Time Systems

9.3 Configuration Parameters Real-Time Ethernet Systems

9.3.1 EtherCAT Slave Parameters

Parameter	Meaning	Range of Value/Value
Interface		
Bus Startup	Communication start application controlled or automatic	Application controlled, Automatic (Default)
Watchdog Time [ms]	Watchdog time within which the device watchdog must be retriggered from the application program while the application program monitoring is activated. When the watchdog time value is equal to 0 the application program monitoring is deactivated.	[0, 20 ... 65535] ms, default = 1000 ms, 0 = Off
I/O Data Status	Status of the input or the output data. For each input and output data the following status information (in Byte) is memorized in the dual-port memory: Status 0 = None (default) Status 1 = 1 Byte (for future use) Status 2 = 4 Byte (for future use)	None, (1 Byte, 4 Byte) Default: None
Ident		
Enabled	If 'Enabled' is unchecked, for the single Ident parameters each the respective default value is used.	
Vendor ID	Identification number of the manufacturer	0x00000000 ... 0xFFFFFFFF (hex) Primary Hilscher Vendor ID: 0x00000044 (hex) Default: Secondary Hilscher Vendor ID: CIFS RE/ECS: 0xE0000044 (hex)
Product Code	Product code of the device as specified by the manufacturer	0x00000000 ... 0xFFFFFFFF (hex), Default: CIFS RE/ECS: 0x00000001 (hex)
Revision Number	Revision number of the device as specified by the manufacturer	0x00000000 ... 0xFFFFFFFF (hex), Default: CIFS RE/ECS: 0x00000002 (hex)
Serial Number	Serial number of the device	0x00000000 ... 0xFFFFFFFF (hex)
Data		
Input Data Bytes	Length of the input data in Byte	0 ... 200** Byte Default: 200 Byte
Output Data Bytes	Length of the output data in Byte	0 ... 200** Byte Default: 200 Byte

Table 64: EtherCAT Slave Parameters



Note: To configure the Master, an XML file (device description file) is required. The settings in the used Master must comply with the settings in the Slave to establish communication. Important parameters are: Vendor ID, Product Code, Serial Number, Revision Number, Output and Input Data Bytes.



Note: If the XML file *Hilscher cifX RE ECS V2.2.x.xml* is use/updated, the firmware with the version **2.2.x** must be use/updated.



Note: **The loadable firmware supports for the number of cyclic input data and for cyclic output data in total up to 400 bytes. If more than 200 bytes for input data or for output data should be exchanged via EtharCAT, then a customer specific XML file is necessary. Additionally the following formular applies: $(\text{number of input bytes} + 3)/4 + (\text{number of output bytes} + 3)/4$ must be less or equal to 100.

9.3.2 EtherNet/IP Adapter Parameters

Parameter	Meaning	Range of Value/Value
Interface		
Bus Startup	Communication start application controlled or automatic	Application controlled, Automatic (Default)
Watchdog Time [ms]	Watchdog time within which the device watchdog must be retriggered from the application program while the application program monitoring is activated. When the watchdog time value is equal to 0 the application program monitoring is deactivated.	[0, 20 ... 65535] ms, default = 1000 ms, 0 = Off
I/O Data Status	Status of the input or the output data. For each input and output data the following status information (in Byte) is memorized in the dual-port memory: Status 0 = None (default) Status 1 = 1 Byte (for future use) Status 2 = 4 Byte (for future use)	None, (1 Byte, 4 Byte) Default: None
Ident		
Enabled	If 'Enabled' is unchecked, for the single Ident parameters each the respective default value is used.	
Vendor ID	Identification number of the manufacturer	0x00000000 ... 0x0000FFFF (hex), Hilscher: 0x0000011B (hex)
Product Code	Product code of the device as specified by the manufacturer	0x00000000 ... 0x0000FFFF (hex), Default CIFS RE/EIS: 0x00000101 (hex)
Product Type	Communication Adapter	0x00000000 ... 0x0000FFFF (hex), Default: 0x0000000C (hex)
Major Rev	Major Revision	0 ... 255, Default: 1
Minor Rev	Minor Revision	0 ... 255, Default: 1
Device name	Device name of the device station as character string, e. g. EtherNet/IP Adapter (Slave).	0 - 31 ASCII characters

For more see next page

Parameter	Meaning	Range of Value/Value
Bus		
IP Address	Valid IP address for the device If 'Enabled' is unchecked (Default setting), the device obtains its IP Address from a DHCP server or also from a BOOTP server, if this one is checked. If 'Enabled' is checked, the device uses the manually entered value.	Valid IP address Default: unchecked
Netmask	Valid Network mask for the device If 'Enabled' is unchecked (Default setting), the device obtains its Netmask from a DHCP server or also from a BOOTP server, if this one is checked. If 'Enabled' is checked, the device uses the manually entered value.	Valid network mask Default: unchecked
Gateway	Valid Gateway address for the device If 'Enabled' is unchecked (Default setting), the device obtains its Gateway Address from a DHCP server or also from a BOOTP server, if this one is checked. If 'Enabled' is checked, the device uses the manually entered value.	Valid gateway address Default: unchecked
	There are three methods available, how the device can obtain its IP Address, Netmask and Gateway Address, one of which must be selected. These methods can also be combined. The device performs the following sequence in order to obtain the addresses: 1. from a DHCP server if DHCP is checked (if a DHCP server provides the requested addresses to the device, then the device uses these addresses) 2. from a BootP server if BootP is checked (if a BootP server provides the requested addresses to the device, then the device uses these addresses) 3. the addresses manually set are used. If the IP Address is set manually also the Network Mask must be set manually. The manually set Gateway Address is optional. If no DHCP server and no BootP server and no manually set addresses exist, then the protocol is not ready for initialization or for operation.	
Flags	BootP: If checked, the device obtains its IP Address, Netmask, Gateway Address from a BOOTP server.	Default: unchecked
	DHCP: If checked, the device obtains its IP Address, Netmask, Gateway Address from a DHCP server.	Default: checked
	100Mbit: Speed Selection, If checked, the device will operate at 100 MBit/s, else at 10 MBit/s. This parameter will not be in effect, when auto-negotiation is active.	Default: unchecked
	FullDuplex: Duplex Operation, If checked, full-duplex operation will be used. The device will operate in half-duplex mode, if this parameter is set to zero. This parameter will not be in effect, when auto-negotiation is active.	Default: unchecked
	Auto-neg.: Auto-Negotiation, If checked, the device will auto-negotiate link parameters with the remote hub or switch.	Default: checked

For more see next page

Parameter	Meaning	Range of Value/Value
Data		
Prod. Data Length	Maximum allowed length of the input data in Byte. This parameter should be equal to or higher than the complete projected input data length, otherwise the EtherNt IP Device will reject the cyclic communication requests.	0 ... 504 Byte Default: 32 Byte
Cons. Data Length	Maximum allowed length of the output data in Byte. This parameter should be equal to or higher than the complete projected output data length, otherwise the EtherNt IP Device will reject the cyclic communication requests.	0 ... 504 Byte Default: 32 Byte

Table 65: EtherNet/IP Adapter Parameters



Note: To configure the Scanner/Master, an EDS file (device description file) is required. The settings in the used Scanner/Master must comply with the settings in the Adapter/Slave to establish communication. Important parameters are: Input, Output Data Bytes, Vendor ID, Product Type, Product Code, Major Rev, Minor Rev, IP Address and Netmask.

9.3.3 Open Modbus/TCP Parameters

Parameter	Meaning	Range of Value/Value
Interface		
Bus Startup	Communication start application controlled or automatic	Application controlled, Automatic (Default)
Watchdog Time [ms]	Watchdog time within which the device watchdog must be retriggered from the application program while the application program monitoring is activated. When the watchdog time value is equal to 0 the application program monitoring is deactivated.	[0, 20 ... 65535] ms, default = 1000 ms, 0 = Off
Protocolmode	Protocolmode: Client or I/O Server For 'Client' (Message Mode) in the navigation area Command Table is displayed. For the Open Modbus/TCP Client the Command Table is a list with commands for the reading or writing of data.	I/O Server (default), Client
Data Swap	Data-storage mode: No: Data will not be swapped Yes: Data will be swapped.	Yes, No, Default: NO
Map FC1 and FC3	If unchecked, data are read from the input area using FC1, FC3 and FC23. If checked, data are read from the output area using FC1, FC3 and FC23. FC1 then can be used instead of FC2 and FC3 instead of FC4.	checked, unchecked, Default: unchecked
Bus		
Provided Server Connections	Server Connections Number of sockets to provide for server requests* *A value of 0 means that the Open Modbus/TCP task exclusively works as TCP Client. A value of 16 means that the Open Modbus/TCP task exclusively works as Server in the Message-Mode. With the default value 4 there are 4 Server connections provided. Then still up to 12 TCP client connections are available. The parameters 'Send Acknowledgement Timeout' (Send Timeout), 'Connect Acknowledgement Timeout' (Connect Timeout) and 'Close Acknowledgement Timeout' (Close Timeout) are for the Timeout between the Open Modbus/TCP Task and the TCP Task.	Sockets: 0 ... 16, Default: 4
Client Connection Watchdog Time	Connection remain open time Only for client jobs in Message Mode (package mode). The connection to the destination-device stays open, until timeout is expired. Note: This timeout starts, after receiving the answer to a command For interface programming via Open Modbus/TCP, the value for Client Connection Watchdog Time (Omb Open Time) must be divided by the factor of 100. (Value range for the interface programming: 1 ... 60,000)	100 ... 6,000,000 ms, Default: 1000 ms
Response Timeout	Telegram Timeout Only for client jobs in Message Mode (package mode). After expiration of this time, the job will be canceled and an error is send to the application. Note: This timeout starts after command is send to the destination device via TCP. For interface programming via Open Modbus/TCP, the value for Response Timeout must be divided by the factor of 100. (Value range for the interface programming: 1 ... 60,000)	100 ... 6,000,000 ms, Default: 2,000 ms

For more see next page

Parameter	Meaning	Range of Value/Value
Send Acknowledgement Timeout	TCP Task SendTimeout Parameter Parameter for TCP task (in milliseconds) . Used OMB task internal. It specifies the timeout for trying to send messages via TCP/IP If the value 0 is selected, the default value of 31,000 milliseconds is used.	0 ... 2,000,000,000 ms, Default: 31,000 ms
Connect Acknowledgement Timeout	TCP Task Connect Timeout Parameter Parameter for TCP task (in milliseconds). Used OMB task internal. It specifies the timeout for trying to establish a connection with the TCP task. If the value 0 is selected, the default value of 31,000 milliseconds is used.	0 ... 2,000,000,000 ms, Default: 31,000 ms
Close Acknowledgement Timeout	TCP Task Close Timeout Parameter Parameter for TCP task (in milliseconds). Used OMB task internal. It specifies the timeout for trying to close a connection with the TCP task. If the value 0 is selected, the default value of 13,000 milliseconds is used.	0 ... 2,000,000,000 ms, Default: 13,000 ms
IP Address	Valid IP address for the device If 'Enabled' is unchecked (Default setting), the device obtains its IP Address from a DHCP or BOOTP server. If 'Enabled' is checked, the device uses the manually entered value.	Valid IP address Default: unchecked
Net Mask	Valid Network mask for the device If 'Enabled' is unchecked (Default setting), the device obtains its Netmask from a DHCP or BOOTP server. If 'Enabled' is checked, the device uses the manually entered value.	Valid network mask Default: unchecked
Gateway	Valid Gateway address for the device If 'Enabled' is unchecked (Default setting), the device obtains its Gateway Address from a DHCP or BOOTP server. If 'Enabled' is checked, the device uses the manually entered value.	Valid gateway address Default: unchecked
	There are three methods available, how the device can obtain its IP Address, Netmask and Gateway Address, one of which must be selected. These methods can also be combined. The device performs the following sequence in order to obtain the addresses: 1. from a DHCP server if DHCP is checked (if a DHCP server provides the requested addresses to the device, then the device uses these addresses) 2. from a BootP server if BootP is checked (if a BootP server provides the requested addresses to the device, then the device uses these addresses) 3. the addresses manually set are used. If the IP Address is set manually also the Network Mask must be set manually. The manually set Gateway Address is optional. If no DHCP server and no BootP server and no manually set addresses exist, then the protocol is not ready for initialization or for operation.	

For more see next page

Parameter	Meaning	Range of Value/Value
Extras	BootP: If checked, the device obtains its IP Address, Netmask, Gateway Address from a BOOTP server.	Default: unchecked.
	DHCP: If checked, the device obtains its IP Address, Netmask, Gateway Address from a DHCP server.	Default: checked.

Table 66: Open Modbus/TCP Parameters

9.3.4 Command Table Open Modbus/TCP

9.3.4.1 For what the Command Table does serve?

For the Open Modbus/TCP Client the **Command Table** is a list with commands for the reading or writing of data.

The **Command Table** is only relevant, if a device works as Client on the Open Modbus/TCP.

From every command line the Open Modbus/TCP Client produces a telegram for reading or for the writing of data to or from an Open Modbus/TCP Server device. For every command are indicated:

- the Open Modbus/TCP Server device address (Device Address),
- the Unit identifier (to identify a remote Server via gateway),
- the Function code (Function Code),
- the data address in the Open Modbus/TCP Server device (Address),
- the number of data (Number of Registers/Coils),
- and the data address in the Open Modbus/TCP Client device (Dual-Port Memory Address).

For writing telegrams (FC 5, 6, 15 and 16) in the column

- Trigger

you can decide, whether the writing telegrams are executed every time (Cyclic) or only at data modification (Change data).

Furthermore

- a Cycle time (Cycle Time)

can be set for every command.

The **Command Table** is processed from the first to the last entry (from above to below). After the execution of the last command the execution of the first command is started again.

For reading commands the Open Modbus/TCP Client reads out data from the Open Modbus/TCP Server and saves them into its data memory.

For writing commands the Open Modbus/TCP Client reads out data from its data memory and writes them into the Open Modbus/TCP Server.

The number of commands which can be defined depends from the firmware and from the Dual-Port Memory layout.

For Open Modbus one connection per IP address is established. In maximum 16 Client connections can be supported. In this case the parameter Open Server Sockets must be set from 4 (Default) to 0.

9.3.4.2 Parameter of the Command Table

Delay: 0

Command Table

	Device Address	Unit Identifier	Function Code	Address	Number of Register/Coils	Dual-Port Memory Add...	Trigger	Cycle Time [ms]
	192.168.10.101		0 Read Holding Registers(FC3)	10	12		0 Cyclic	0
▶	192.168.10.101		0 Preset Multiple Register(FC16)	30	2		0 Changed I	0

Add Remove

Figure 70: Pane Command Table

Each command contains the following parameters:

Parameter	Description
Device Address	Open Modbus/TCP Server IP address
Unit Identifier	to identify a remote Server via gateway
Function Code	Function code
Address	data address in the Open Modbus/TCP Server device
Number of Registers/Coils	Number of data
Dual-Port Memory Address	Data address in the Open Modbus/TCP Client device (= Byte address in the process image of the Open Modbus/TCP Client device)
Trigger	Trigger for writing commands
Cycle Time	Cycle time

Table 67: Parameter of the Command Table

Parameter	Meaning	Range of Value/Value																																							
Device Address	Specifies the Open Modbus/TCP Server device address, from which the Open Modbus/TCP Client device reads out the data or into which it writes the data.	For Open Modbus/TCP: 000.000.000.000-255.255.255.255 , Default: 000.000.000.000																																							
Unit Identifier	To identify a remote Server connected on a serial line or on other buses. The Unit Identifier is initialized by the Client. Do not change for response!	0 ... 247, Default: 0																																							
Function Code	Indicates the function code for reading or writing commands [3]: Read Coils(FC1) Read Inputs(FC2) Read Holding Registers(FC3) Read Input Registers(FC4) Force Single Coil(FC5) Preset Single Register(FC6) Force Multiple Coils(FC15) Preset Multiple Registers(FC16)	1 / 2 / 3 / 4 / 5 / 6 / 15 / 16 Default: „Read Coils (FC1)“																																							
Address	Indicates the data address in the Open Modbus/TCP Server device. The parameter Address contains the register address in the Open Modbus/TCP Server device. The register address is counted for every function code beginning with 0. The following table shows the assignment of the Address to the data address in the Open Modbus/TCP Server by Function code: <table><tr><th rowspan="2">Parameter Address</th><th colspan="4">Data Address Open Modbus/TCP Server</th></tr><tr><th>FC 1 FC 5 FC 15</th><th>FC 2</th><th>FC 4</th><th>FC 3 FC 6 FC 16</th></tr><tr><td>0</td><td>1</td><td>10001</td><td>30001</td><td>40001</td></tr><tr><td>1</td><td>2</td><td>10002</td><td>30002</td><td>40002</td></tr><tr><td>2</td><td>3</td><td>10003</td><td>30003</td><td>40003</td></tr><tr><td>3</td><td>4</td><td>10004</td><td>30004</td><td>40004</td></tr><tr><td>4</td><td>5</td><td>10005</td><td>30005</td><td>40005</td></tr><tr><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td></tr></table>  To know, which data address with which data of the Open Modbus/TCP Server devices is provided for reading or for writing, refer to the device description of the Open Modbus/TCP Server device manufacturer.	Parameter Address	Data Address Open Modbus/TCP Server				FC 1 FC 5 FC 15	FC 2	FC 4	FC 3 FC 6 FC 16	0	1	10001	30001	40001	1	2	10002	30002	40002	2	3	10003	30003	40003	3	4	10004	30004	40004	4	5	10005	30005	40005	...	...	...	...	...	0 ... 65.535 Default: 0
Parameter Address	Data Address Open Modbus/TCP Server																																								
	FC 1 FC 5 FC 15	FC 2	FC 4	FC 3 FC 6 FC 16																																					
0	1	10001	30001	40001																																					
1	2	10002	30002	40002																																					
2	3	10003	30003	40003																																					
3	4	10004	30004	40004																																					
4	5	10005	30005	40005																																					
...	...	...	...	...																																					
Number of Registers/Coils	Indicates the number of reading or writing data as registers or coils. The maximum value depends from the function code.	1 ... max. value, Default: 1 max. value for FC1 = 2000 (Coils), FC2 = 2000 (Coils), FC3 = 125 (Registers), FC4 = 125 (Registers), FC5 = 1 (Coils), FC6 = 1 (Registers), FC15 = 1968 (Coils), FC16 = 123 (Registers)																																							

For more see next page

Parameter	Meaning	Range of Value/Value
Dual-Port Memory Address	Byte address in the process image of the Open Modbus/TCP Client device for input or output data of the Client The configuration software calculates the byte address in the process image of the Client for the input or for the output data automatically. Because of this definition, for function codes for reading (FC 1, 2, 3 and 4) the data are assigned consecutively in the process image for input data and for function codes for writing (FC 5, 6, 15 and 16) the data are assigned consecutively in the process image for output data.	0 ... 5759 Default: 0
Trigger	Defines for all function codes for writing (FC 5, 6, 15 and 16); if the command is to be executed cyclically (Cyclic) or only if the data have changed (Change Data). For function codes for reading (FC 1, 2, 3 und 4) this parameter is not used.	0 = Cyclic 1 = Changed Data Default: „Cyclic“
Cycle Time	The cycle time defines, after how many milliseconds a writing or a reading command shall be reexecuted. The default value „0 ms“ means, that the command is executed as fast as possible. Otherwise the execution can be defined in steps of 10 ms. With the cycle time the temporal execution of the command can be influenced. If since the last execution of the command the set cycle time or more time has been passed, the command is reexecuted. If since the last execution of the command less time has been passed then the cycle time, the command is skipped. <i>If e. g. from a Open Modbus/TCP Server data are required only every 10 seconds, as these one change only slowly, then for the cycle time enter 10.000 ms.</i>	0, 10, 20, 30, ... 60.000 ms Default: 0 ms
Delay	Between the single commands a delay time can be parameterized. This sometimes is necessary to avoid a too high load of the connected Server devices by a continuous communication. 0: The commands are processed without delay. 1 ... 60.000 ms: Delay time in ms, the Open Modbus/TCP Client waits, before starting the next command.	0 ... 60.000 ms Default: 0

Table 68: Parameter of the Command Table

9.3.4.3 Adding/removing Command

To add or to remove data sets for commands to the Command Table, proceed as follows:

Add command:

- In the table **Command Table** put the cursor in the line below which a new data set for a command shall be added.
- Click **Add**.
- Under the clicked line a new command is added.

Remove command:

- In the table **Command Table** put the cursor in the line with the data set to be deleted.
- Click **Remove**.
- The command of the clicked line is not shown any more.

9.3.4.4 Setting Parameters



Important: When entering the parameters, make sure that these address valid data registers. *(Refer to the device description of the Open Modbus/TCP Server device manufacturer.)*

To set the single parameters in the Command Table, proceed as follows:

1. Device Address, Function Code, Address, Number of Registers/Coils:

The fields for these parameters are editable.

- Enter the values for these parameters to the corresponding table cells.

2. Trigger:

- In **Function Code** field select an entry for a writing command (FC 5, 6, 15 or 16).
- In the column **Trigger** select the entry „Cyclic“ or „Change Data“.

3. Cycle Time:

- Put the cursor to the table cell and set the cycle time using the spin box  in steps of 10 ms.

9.3.4.5 Examples Open Modbus/TCP Reading or Writing Command

Device Address	Unit Identifier	Function Code	Address	Number of Register/Coils	Dual-Port Memory Add...	Trigger	Cycle Time [ms]
192.168.10.101		0 Read Holding Registers(FC3)	10	12		0 Cyclic	0
192.168.10.101		0 Preset Multiple Register(FC16)	30	2		0 Changed Data	0

Figure 71: Examples - Reading Command with FC 3, Writing Command with FC16

Example Reading Command with FC 3: From the Open Modbus/TCP Server device with the Modbus address 8 from data address 40011 onwards 12 registers are read by function code 3. The data are assigned to the dual-port memory address 0.

Example Writing Command with FC 16: To the Open Modbus/TCP Server with the Modbus address 8 from data address 40031 onwards 12 registers are written by function code 16. The data are read from the process image of the Client from the dual-port memory address 0 onwards. The writing process is only performed, if the data in the process image of the Client on the dual-port memory addresses 0 to 3 have changed, as the parameter trigger is set to 'changed'.

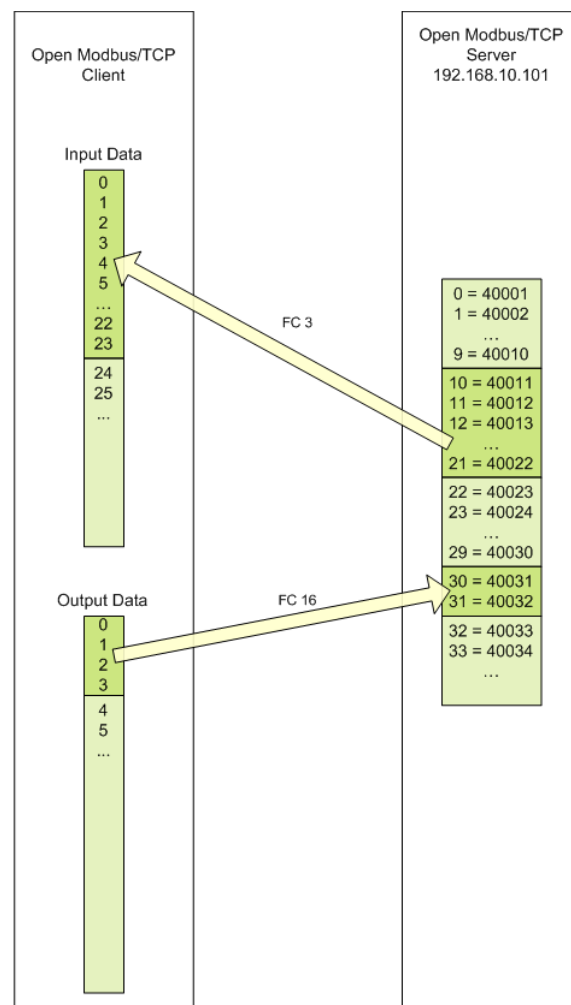


Figure 72: Examples - Reading Command with FC 3, Writing Command with FC16

9.3.5 Powerlink Controlled Node/Slave Parameters

Parameter	Meaning	Range of Value/Value
Interface		
Bus Startup	Communication start application controlled or automatic	Application controlled, Automatic Default CIFX RE/PLS: Automatic
Watchdog Time [ms]	Watchdog time within which the device watchdog must be retriggered from the application program while the application program monitoring is activated. When the watchdog time value is equal to 0 the application program monitoring is deactivated.	[0, 20 ... 65535] ms, default = 1000 ms, 0 = Off
I/O Data Status	Status of the input or the output data. For each input and output data the following status information (in Byte) is memorized in the dual-port memory: Status 0 = None (default) Status 1 = 1 Byte (for future use) Status 2 = 4 Byte (for future use)	None, (1 Byte, 4 Byte) Default: None
Disable Host-Triggered Input Data Exchange	Decides, whether host-triggered update for input data exchange is enabled (hook checked) or disabled (hook unchecked).	Default: unchecked
Disable Host-Triggered Output Data Exchange	Decides, whether host-triggered update for output data exchange is enabled (hook checked) or disabled (hook unchecked).	Default: unchecked
Ident		
Enabled	If 'Enabled' is unchecked, for the single Ident parameters each the respective default value is used.	
Vendor ID	Identification number of the manufacturer If 'Enabled' is unchecked, the default value is used.	0x00000000 ... 0xFFFFFFFF (hex), Hilscher: 0x00000044 (hex)
Serial Number	Serial number of the device	0x00000000 ... 0xFFFFFFFF (hex), Default CIFX RE/PLS: 0x00000000 (hex)
Product Code	Product code of the device as specified by the manufacturer	0x00000000 ... 0xFFFFFFFF (hex), Default CIFX RE/PLS: 0x00000001 (hex)
Revision Number	Revision number of the device as specified by the manufacturer	0x00000000 ... 0xFFFFFFFF (hex), Default CIFX RE/PLS: 0x00000000 (hex)

For more see next page

Parameter	Meaning	Range of Value/Value
Bus		
Node Id	EPL Node ID (EPL = Ethernet Powerlink)	1...239, Default CIFS RE/PLS:1
DNS Node Name	DNS-compatible name of the Powerlink Controlled Node/Slave	
Gateway Address	Gateway address for IP stack	Default CIFS RE/PLS: 192.168.100.254
Data		
Input Data Bytes	Length of the input data in byte	1... 1490 Byte, Default: 4 Byte
Output Data Bytes	Length of the output data in byte	1... 1490 Byte, Default: 4 Byte
Disable PDO Mapping Version Check	Decides, whether PDO mapping version is checked (hook checked) or not checked (hook unchecked).	Default: checked
Configure Default Objects	Decides, whether default objects are created (hook checked) or not (hook unchecked). If the objects will be created, the old set of previously existing objects will be cleared	Default: checked
Delete Application Objects	Decides, whether application objects are deleted (hook checked) or not (hook unchecked). When 'Configure Default Objects' is checked, then the firmware automatically does a 'Delete Application Objects'.	Default: checked

Table 69: Powerlink Controlled Node/Slave Parameters



Note: To configure the Managing Node/Master, an XDD file (device description file) is required. The settings in the used Managing Node/Master must comply with the settings in the Controlled Node/Slave, to establish communication. Important parameters are: Vendor ID, Product Code, Serial Number, Revision Number, Node ID, Output and Input length.

9.3.6 PROFINET IO-Device Parameters

Parameter	Meaning	Range of Value/Value
Interface		
Bus Startup	Communication start application controlled or automatic	Application controlled, Automatic Default CIFX RE/PNS: Automatic
Watchdog Time [ms]	Watchdog time within which the device watchdog must be retriggered from the application program while the application program monitoring is activated. When the watchdog time value is equal to 0 the application program monitoring is deactivated.	[0, 20 ... 65535] ms, default = 1000 ms, 0 = Off
I/O Data Status	Status of the input or the output data. For each input and output data the following status information (in Byte) is memorized in the dual-port memory: Status 0 = None (default) Status 1 = 1 Byte (for future use) Status 2 = 4 Byte (for future use)	None, (1 Byte, 4 Byte) Default: None
Ident		
Enabled	If 'Enabled' is unchecked, for the single Ident parameters each the respective default value is used.	
Vendor ID	Identification number of the manufacturer, assigned by PROFIBUS Nutzerorganisation e. V.	0x00000000 ... 0xFFFFFFFF (hex), Hilscher: 0x00000011E (hex)
Device ID	Identification number of the device, freely eligible by the manufacturer, fixed for every device.	0x00000000 ... 0x0000FFFF (hex), CIFX RE/PNS: 0x00000103 (hex)
Device Type	Description of the device type, freely eligible	Character string, 0 ... 25 characters
Order ID	Hilscher device number or order description of the customer for its device	Character string, 0 ... 20 characters, e. g.: CIFX 50-RE: 1251 100
Name of Station	Station name of the PROFINET IO-Device station. It has to match the station name configured in the PROFINET IO-Controller for this device. Must be DNS compatible name.	Character string, 1 ... 240 characters, Default: See GSDML-File
Type of Station	Type name of the PROFINET station; name can be assigned freely.	Character string, 1 ... 240 characters Default: See GSDML-File

Further see next page

Parameter	Meaning	Range of Value/Value
Data		
Output or Input	Module: for output modules for input modules	1 ... 4 5 ... 8
	Type:	Byte, Integer8, Integer16, Integer32, Integer64, Unsigned8, Unsigned16, Unsigned32, Unsigned64, Float32, Float64 (jeweils mit Konsistenz) Default: Byte
	Count: The number of Data Type in the module.	0, 1, 2, 3, 4, 8, 12, 16, 20, 32, 64 Possible selections for: Byte: 0, 1, 2, 3, 4, 8, 12, 16, 20, 32, 64 any other Data Types: 0, 1
Output Data Bytes	Total of the output identifier bytes of the modules 1 to 4	0 ... 1024 Byte CIFX RE/PNS: Default: 128 Byte
Input Data Bytes	Total of the input identifier bytes of the modules 5 to 8	0 ... 1024 Byte CIFX RE/PNS: Default: 128 Byte

Table 70: PROFINET IO-Device Parameters



Note: To configure the Controller, a GSDML file (device description file) is required. The settings in the used Controller must comply with the settings in the Device to establish communication. Important parameters are: Station Name, Vendor ID, Device ID, Input and Output Data Bytes.



Note: Under **Name of Station**, the name must be typed which was also used in the configuration file of the master of this device. If no name chosen freely is used in the configuration file, then the name from the GSDML file is used.

9.3.7 SERCOS III Slave Parameters

Parameter	Meaning	Range of Value/Value
Interface		
Bus Startup	Communication start application controlled or automatic	Application controlled, Automatic (Default)
Watchdog Time [ms]	Watchdog time within which the device watchdog must be retriggered from the application program while the application program monitoring is activated. When the watchdog time value is equal to 0 the application program monitoring is deactivated.	[0, 20 ... 65535] ms, Default = 1000 ms, 0 = Off
Ident		
Device ID	Identification number of the device. This is a unique device ID managed by the vendor and identifies the component number. The device ID is fixed for every device. Device ID according to the SERCOS III specification as defined in IDN S-0-1300.x.05.	Default: <i>(in development)</i>
Vendor Code	Identification number of the manufacturer, assigned by SERCOS International. Vendor Code according to the SERCOS III specification as defined in IDN S-0-1300.x.03.	0x00000000 ... 0xFFFFFFFF (hex), Hilscher: 0x0000003E8 (hex)
Version of SCP Sync	Version of the SERCOS Communication Profile SYNC	0 ... 255, Default: 0
Version of SCP NRT	Version of the SERCOS Communication Profile NRT	0 ... 255, Default: 0
Bus		
Enabled	If 'Enabled' is unchecked, for the single Ident parameters each the respective default value is used.	checked, unchecked
IP Address	Valid IP address for the device If 'Enabled' is unchecked (Default setting), the device obtains its IP Address from a DHCP or BOOTP server. If 'Enabled' is checked, the device uses the manually entered value.	Valid IP address, Default for 'Enabled': unchecked
Netmask	Valid Network mask for the device If 'Enabled' is unchecked (Default setting), the device obtains its Netmask from a DHCP or BOOTP server. If 'Enabled' is checked, the device uses the manually entered value.	Valid network mask, Default for 'Enabled': unchecked
Gateway	Valid Gateway address for the device If 'Enabled' is unchecked (Default setting), the device obtains its Gateway Address from a DHCP or BOOTP server. If 'Enabled' is checked, the device uses the manually entered value.	Valid gateway address, Default for 'Enabled': unchecked
	There are three methods available, how the device can obtain its IP Address, Netmask and Gateway Address, one of which must be selected. These methods can also be combined. The device performs the following sequence in order to obtain the addresses: 1. from a DHCP server if DHCP is checked (if a DHCP server provides the requested addresses to the device, then the device uses these addresses) 2. from a BootP server if BootP is checked (if a BootP server provides the requested addresses to the device, then the device uses these addresses) 3. the addresses manually set are used. If the IP Address is set manually also the Network Mask must be set manually. The manually set Gateway Address is optional. If no DHCP server and no BootP server and no manually set addresses exist, then the protocol is not ready for initialization or for operation.	

Further see next page

Parameter	Meaning	Range of Value/Value
TCP Flags	BootP: If checked, the device obtains its IP Address, Netmask, Gateway Address from a BOOTP server.	checked, unchecked (Default)
	DHCP: If checked, the device obtains its IP Address, Netmask, Gateway Address from a DHCP server.	checked (Default), unchecked
Configuration Data Parameters of the Sercos Communication Profile Class SCP_Sync		
Control Clock Length*	This timing parameter defines the time how long the communication synchronized hardware output signal CON_CLK is set. The maximum valid value of the „Control Clock Length“ depends on the configured cycle time. In general the signal CON_CLK must go to inactive again before the next cycle starts.	>= 1000 ns, Default: 1000 ns
Time Divided Control Clock*	This timing parameter defines the delay time from the start of the communication cycle to the first pulse of the communication synchronized hardware output signal DIV_CLK.	0 ... 16.777.210 ns, Default: 1000 ns
Delay Time of Divided Clock*	This timing parameter defines the delay time respectively the distance between two pulses of the communication synchronized hardware output signal DIV_CLK. In the „Divided Control Clock“ Mode1 this parameter is ignored.	0 ... 6.710.860 ns, Default: 1000 ns
Divided Control Clock Length*	This timing parameter defines the pulse length, i. e. how long the communication synchronized hardware output signal DIV_CLK is set.	1000 ... 20.000 ns, Default: 1000 ns
	*All timing values are handled as multiple of 10 ns (e. g. Control Clock Length = 1005 ns is handled as 1000 ns).	
Count Register	For „Divided Control Clock“ Mode0: Here the parameter indicates the number of pulses of the communication synchronized hardware output signal DIV_CLK within a communication cycle. For „Divided Control Clock“ Mode1: Here the parameter indicates the number of communication cycles.	0 ... 255, Default: 100
Divided Control Clock Output	This communication synchronization flag defines the output state of the communication synchronized hardware output signal DIV_CLK.	Disabled, High Activity (Default), Low Activity
Divided Control Clock Mode	This communication synchronization flag defines the mode of the communication synchronized hardware output signal DIV_CLK. Mode 0: The Div_Clk signal becomes active several times within a communication cycle. The following condition must be fulfilled in mode 0: „Divided Control Clock Length“ + 100 <= „Delay Time of Divided Clock“. Mode 1: The Div_Clk signal becomes active once after N communication cycles.	Mode 0 (Default), Mode 1
Controller Clock Output	This communication synchronization flag defines the output state of the communication synchronized hardware output signal CON_CLK.	Disabled (Default), High Activity, Low Activity
Slave Configuration		
Number of Slaves	The number of used SERCOS addresses	1 ... 8, Default: 3
Slave 1 ... 8		
SERCOS III Address	Address for the SERCOS III Slave. The address range is from 0 to 511.	0 ... 511, Default: 0
FSP Type	Function Specific Profile Type according to IDN S-0-1302.x.01 FSP Type & Version: The FSP Type indicates the function specific type of the resource.	IO V1, Drive V1 (Default)

Further see next page

Parameter	Meaning	Range of Value/Value
Slave 1 ... 8 (continued)		
FSP Type (continued)	Supported FSP profiles: FSP_IO, FSP_Drive FSP IO: A specification for IO Devices to be controlled by SERCOS III, FSP Drive: A specification for mechanical drives to be controlled by SERCOS III	IO V1, Drive V1 (Default)
SCP Configuration Type	SCP config type according to SERCOS III specification: 0x0101 - SCP_FixCFG Version 1.1.1, 0x0201 - SCP_VarCFG Version 1.1.1, 0x0202 - SCP_VarCFG Version 1.1.3 According to the SERCOS III specification the SERCOS Communication Profiles Classes SCP-FixCFG and SCP-VarCFG define the basic communication and are mutually exclusive. SCP-FixCFG: Exact two connections are supported, one as consumer and one as producer. The content of the connections is defined by the Slave and cannot be changed by the Master. SCP-VarCFG: A certain number of connections is supported. The Slave defines this number and provides it to the Master. The content of all connections has to be configured (e.g. by the Master). The Slave provides lists of IDNs, that can be cyclically produced and consumed, so the Master can find it out.	Fix. Version 1.1.1 (Default), Var. Version 1.1.1, Var. Version 1.1.3
Output Data Size for Fixed Configuration	Output Data Size in Byte for „SCP Configuration Type“ / „Fix. Version 1.1.1“	0 ... 200 Byte, Default: 200 Byte
Input Data Size for Fixed Configuration	Input Data Size in Byte for „SCP Configuration Type“ / „Fix. Version 1.1.1“	0 ... 200 Byte, Default: 200 Byte
User SCP Types	Up to 20 User SCP Types are possible. The following User SCP types are already defined: 0x0401 - SCP_WD Version 1.1.1 for monitoring connections, 0x0501 - SCP_Diag Version 1.1.1 for bus-diagnosis, 0x0601 - SCP_RTb Version 1.1.1 for using Real time bits, 0x0901 - SCP_Mux Version 1.1.1 for multiplexed cyclic data, 0x0B01 - SCP_Sig Version 1.1.1 for using signal status/control words	SCP_WD Version 1.1.1, SCP_Diag Version 1.1.1, SCP_RTb Version 1.1.1, SCP_Mux Version 1.1.1, SCP_Sig Version 1.1.1
Slave Flags	Setup a Default OD	checked, unchecked (Default)
	Non Stack Objects Are Deleted (for Reset/Channel Init)	checked, unchecked (Default)
	SERCOS Address May be Changed by the Master	checked, unchecked (Default)
Connection Control Offset	Connection Control Offset for the Slave connections 1, 2, 3 and 4	0 ... 5.758, Default: 0
Real Time Data Process Image Offset	Real Time Data Process Image Offset for the Slave connections 1, 2, 3 and 4	0 ... 5.760, Default: 0
Real Time Data Maximum Length	Real Time Data Maximum Length for the Slave connections 1, 2, 3 and 4	0 ... 200 Byte, Default: 0 Byte

Table 71: SERCOS III Slave Parameter



Note: To configure the Master, an XML file (device description file) is required. The settings in the used Master must comply with the settings in the Slave to establish communication.

10 Diagnostic with netX Configuration Tool

10.1 Diagnostic Dialog

10.1.1 'General' Dialog

In the general **Diagnostic** dialog information regarding the device state and other general diagnosis parameters are displayed.

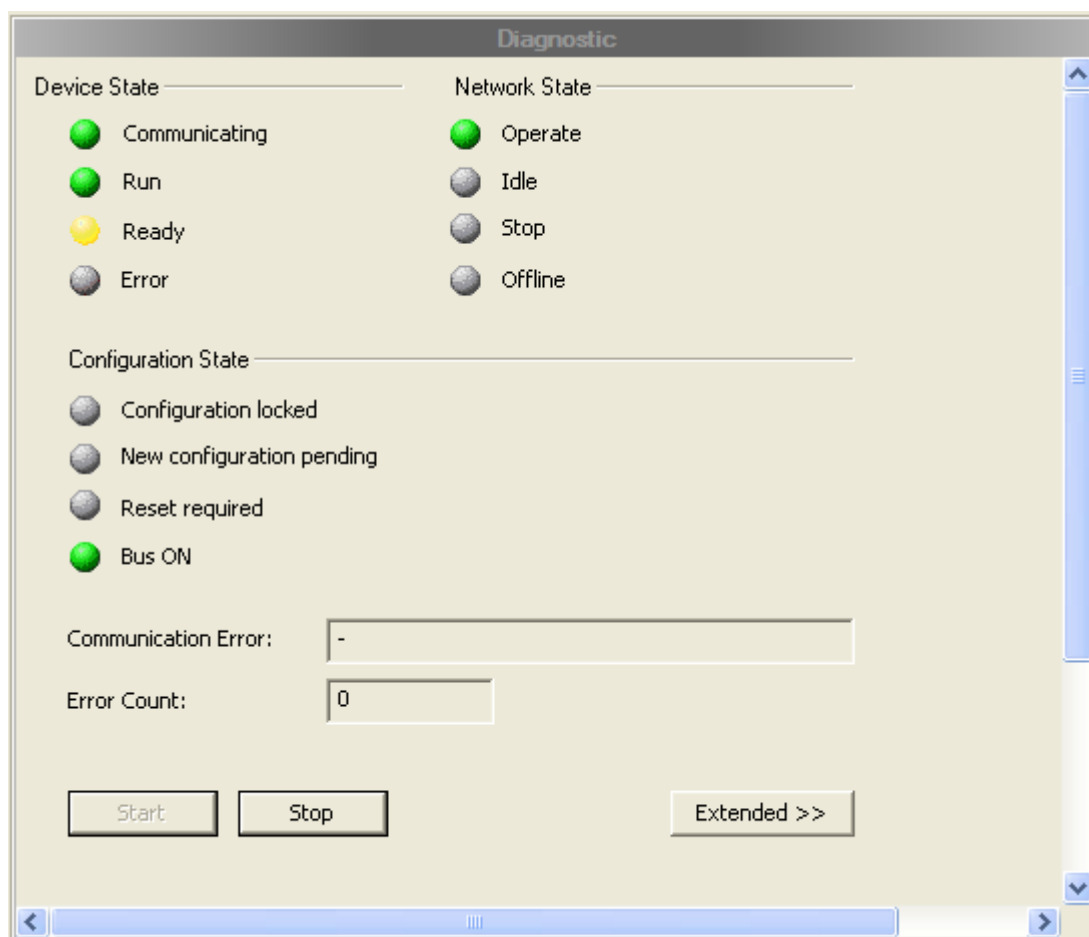


Figure 73: General Diagnostic

LED	Meaning	Color	State
Device State			
Communicating	Shows whether the Slave device executes the network communication.	 (green)	COMMUNICATING
		 (gray)	Not COMMUNICATING
Run	Shows whether the Slave device has been configured correctly.	 (green)	Configuration OK
		 (gray)	Configuration not OK
Ready	Shows whether the Slave device has been started correctly. The Slave device waits for a configuration.	 (yellow)	Device READY
		 (gray)	Device not READY
Error	Shows whether the Slave device records a device status error. For further information about the error characteristics and the number of counted errors refer to the extended diagnosis.	 (red)	ERROR
		 (gray)	No ERROR
Network State			
Operate	Shows whether the Slave device is in data exchange. In a cyclic data exchange the input data or the output data of the Master are transmitted to the Slave.	 (green)	In OPERATION state
		 (gray)	Not in OPERATION state
Idle	Shows whether the Slave device is in idle state.	 (yellow)	In IDLE state
		 (gray)	Not in IDLE state
Stop	Shows whether the Slave device is in Stop state: There is no cyclic data exchange at the Slave network. The Slave device was stopped by the application program or it changed to the Stop state because of a bus error.	 (red)	In STOP state
		 (gray)	Not in STOP state
Offline	The Slave is offline as long as it does not have a valid configuration.	 (yellow)	In OFFLINE state
		 (gray)	Not in OFFLINE state
Configuration State			
Configuration locked	Shows whether the Slave device configuration is locked, to avoid the configuration data are typed over.	 (yellow)	Configuration LOCKED
		 (gray)	Configuration not LOCKED
New Configuration pending	Shows whether a new Slave device configuration is available.	 (yellow)	New Configuration pending
		 (gray)	No new Configuration pending
Reset required	Shows whether a firmware reset is required as a new Slave device configuration has been loaded into the device.	 (yellow)	RESET required
		 (gray)	No RESET required
Bus ON	Shows whether the bus communication was started or stopped. I. e., whether the device is active on the bus or no bus communication to the device is possible and no response telegrams are sent.	 (green)	Bus ON
		 (gray)	Bus OFF

Table 72: Diagnostic (General)

Parameter	Meaning
Communication Error	Indicates the name of the communication error. If the cause of error is resolved, the value is set to zero again.
Error Count	This field holds the total number of errors detected since power-up, respectively after reset. The protocol stack counts all sorts of errors in this field no matter if they were network related or caused internally.

Table 73: Parameter Diagnostic (General)

Start/Stop Communication	
	Start is enabled, if the communication has been stopped before or if the configuration requires this (for Bus startup ,Application Controlled'). Start the the communication to the Master: ➤ Click Start. ⇒ The device communicates at the bus.
	Stop is enabled, if the communication has been started. Stop the the communication to the Master: ➤ Click Stop. ⇒ Die Kommunikation des Gerätes am Bus wird gestoppt.
Extended >>	
	Open the extended Diagnostic: ➤ Click Extended >>. ⇒ The window extended Diagnostic is displayed.

Table 74: Start/Stop Communication, Extended >>

10.1.2 'Extended' Dialog

In the extended **Diagnostic** dialog under **Tasks Information** a task can be selected to have access to the extended diagnosis information of this task.

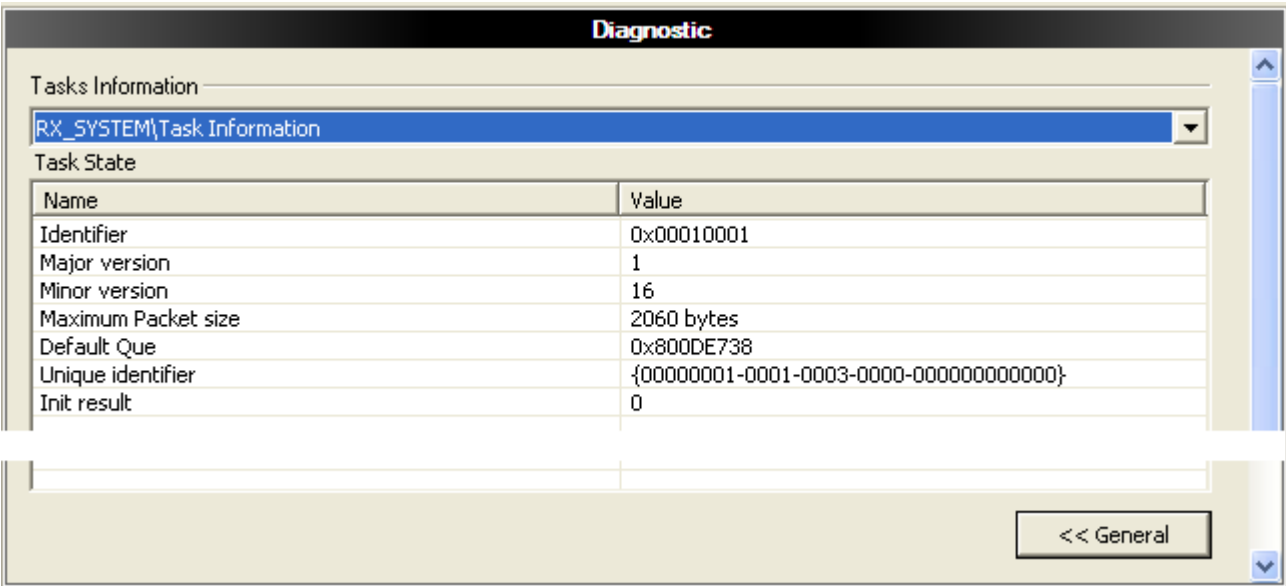


Figure 74: Example general Diagnostic

Tasks Information / Task State	
	Select Task: ➤ Click Tasks Information . ➤ Select a task. ➤ The extended diagnosis information of this task are displayed in the Task State window. For the descriptions of the extended diagnosis refer to the section 'Extended' Diagnosis on page 194.
<< General	
	Open the general Diagnostic: ➤ Click << General. ➤ The window general Diagnostic is displayed.

Table 75: Tasks Information / Task State, << General

10.2 'Extended' Diagnosis

The **Extended Diagnosis** of the **netX Configuration Tool** helps to find communication and configuration errors. Therefore it contains a list of diagnosis structures as online counter, states and parameters.

Overview Dialog Panes "Extended Diagnosis"

For an overview of the descriptions of the dialogue windows under **Extended Diagnosis** for every communication system refer to the following subsections.

Subsection/ Communication System	Manual Page
<i>EtherNet/IP Adapter</i>	195
<i>Open Modbus/TCP</i>	196
<i>PROFINET IO Device</i>	197
<i>SERCOS III</i>	197

Table 76: Overview Extended Diagnosis

10.2.1 EtherNet/IP Adapter

Dialog Panes “Extended Diagnosis” EtherNet/IP Adapter

The table below gives an overview for the **Extended Diagnosis** dialog panes descriptions:

Folder Name in the Navigation Area	Dialog Pane	Manual Page
<i>RX-SYSTEM</i>	<i>Task Information</i>	198
	<i>IniBatch Status</i>	199
<i>DPM_COM0_SMBX</i>	<i>Task Information</i>	198
<i>DPM_COM0_RMBX</i>	<i>Task Information</i>	198
<i>EIS_CL1_TASK</i>	<i>Task Information</i>	198
<i>EIS_ENCAP_TASK</i>	<i>Task Information</i>	198
	<i>Encap Command Counter</i>	206
	<i>Packet Counter</i>	207
	<i>Code Diagnosis</i>	200
<i>EIS_OBJECT_TASK</i>	<i>Task Information</i>	198
	<i>Object Request Counter</i>	208
	<i>Outgoing Connection</i>	209
	<i>Ingoing Connection</i>	209
	<i>Code Diagnosis</i>	200
<i>EIS_TCPUDP</i>	<i>Task Information</i>	198
	<i>IP Information</i>	201
	<i>IP Packet Counter</i>	202
	<i>IP Code Diagnosis</i>	203
	<i>TCP_UDP Information</i>	204
	<i>TCP_UDP Code Diagnosis</i>	205
<i>EIS_AP_TASK</i>	<i>Task Information</i>	198
	<i>Common Diagnostic</i>	210
	<i>General State</i>	210
	<i>Code Diagnosis</i>	200

Table 77: Descriptions of the Dialog Panes Extended Diagnosis EtherNet/IP Adapter

10.2.2 Open Modbus/TCP

Dialog Panes “Extended Diagnosis” Open Modbus/TCP

The table below gives an overview for the **Extended Diagnosis** dialog panes descriptions:

Folder Name in the Navigation Area	Dialog Pane	Manual Page
<i>RX-SYSTEM</i>	<i>Task Information</i>	198
	<i>IniBatch Status</i>	199
<i>DPM_COM0_SMBX</i>	<i>Task Information</i>	198
<i>DPM_COM0_RMBX</i>	<i>Task Information</i>	198
<i>TCPUDP</i>	<i>Task Information</i>	198
	<i>IP Information</i>	201
	<i>IP Packet Counter</i>	202
	<i>IP Code Diagnosis</i>	203
	<i>TCP_UDP Information</i>	204
	<i>TCP_UDP Code Diagnosis</i>	205
<i>OMB</i>	<i>Task Information</i>	198
	<i>OMB Information</i>	211
	<i>OMB Client</i>	212
	<i>OMB Server</i>	213
	<i>OMB IO</i>	214
	<i>OMB Code Diagnosis</i>	215
<i>OMB_AP</i>	<i>Task Information</i>	198

Table 78: Descriptions of the Dialog Panes Extended Diagnosis Open Modbus/TCP

10.2.3 PROFINET IO Device

Dialog Panes “Extended Diagnosis” PROFINET IO Device

The table below gives an overview for the **Extended Diagnosis** dialog panes descriptions:

Folder Name in the Navigation Area	Dialog Pane	Manual Page
<i>RX-SYSTEM</i>	<i>Task Information</i>	198
	<i>IniBatch Status</i>	199
<i>DPM_COM0_SMBX</i>	<i>Task Information</i>	198
<i>DPM_COM0_RMBX</i>	<i>Task Information</i>	198
<i>TCPUDP</i>	<i>Task Information</i>	198
	<i>IP Information</i>	201
	<i>IP Packet Counter</i>	202
	<i>IP Code Diagnosis</i>	203
	<i>TCP_UDP Information</i>	204
	<i>TCP_UDP Code Diagnosis</i>	205
<i>PNS_IF</i>	<i>Task Information</i>	198
	<i>PROFINET Stack State</i>	216
	<i>Station Description</i>	217

Table 79: Descriptions of the Dialog Panes Extended Diagnosis PROFINET IO Device

10.2.4 SERCOS III

Dialog Panes “Extended Diagnosis” SERCOS III

The table below gives an overview for the **Extended Diagnosis** dialog panes descriptions:

Folder Name in the Navigation Area	Dialog Pane	Manual Page
<i>RX-SYSTEM</i>	<i>Task Information</i>	198
	<i>IniBatch Status</i>	199
<i>DPM_COM0_SMBX</i>	<i>Task Information</i>	198
<i>DPM_COM0_RMBX</i>	<i>Task Information</i>	198
<i>SC3S_SVC</i>	<i>Task Information</i>	198
<i>SC3S_RTD</i>	<i>Task Information</i>	198
<i>SC3S_AP</i>	<i>Task Information</i>	198

Table 80: Descriptions of the Dialog Panes Extended Diagnosis SERCOS III

10.3 Task Information

Task Information	
Task states	
Name	Value
Identifier	
Major version	<i>{The displayed values depend from the corresponding task}</i>
Minor version	
Maximum Packet size	
Default Que	
Unique identifier	
Init result	

Figure 75: Extended Diagnosis > [Folder Name] > Task Information Example Display

Name	Description
Identifier	Identification number of the task
Major version	Task version, contains incompatible changes
Minor version	Task version, contains compatible changes
Maximum package size	Maximum package size, which the task sends
Default Queue	Queue handle, which is accessible via DPM by mailbox.
UUID	Unique user ID, 16 Byte indicator used for task identification and its affiliation e. g. to a stack (therein different identification data are coded in).
Init result	Error Code, 0= no Error The description of the error codes can be found in this manual or in the corresponding software reference manuals.

Table 81: Extended Diagnosis > [Folder Name] > Task Information

10.4 IniBatch Status

IniBatch-Status	
Task-Status	
Name	Value
Communication Channel	0
Current State	Error
IniBatch Result	No DBM file
OpenDbm Result	24975
SendPacket Result	0
Confirmation Result	0
Last Packet Number	0
Last Packet Command	0
Last Packet Length	0
Last Packet Destination	0

Figure 76: Extended Diagnosis > [Folder Name] > IniBatch Status Example Display

Name	Description
Communication Channel	Number of the communication channel used by the device.
Current State	0 = Idle; 1 = IniBatch packets in progress; 2 = Retrying to send last packet; 3 = Error
IniBatch Result	0 = Ok; 1 = No DBM file; 2 = No Packet table; 3 = No data set available; 4 = Data set is shorter than packet length; 5 = Packet Buffer is shorter than Packet length; 6 = Invalid packet destination; 7 = Logical queue not defined 8 = Send packet failed; 9 = Too many retries; 10 = Error in confirmation packet status
OpenDbm Result	Error when opening the IniBatch data base Under "OpenDbm Result" the error code is typed in, when "IniBatch Result" == "No DBM file" (1) is.
SendPacket Result	Error when sending a packet Under "SendPacket Result" the error code is typed in, when "IniBatch Result" == "send packet failed" (8) is.
Confirmation Result	Confirmation error when sending packets Under "Confirmation Result" the package specific error code from the ulSta is typed in, when "IniBatch Result " == "Error in confirmation packet status" (10) is.
Last Packet Number	Value depends by the communication system.
Last Packet Command	Value depends by the communication system.
Last Packet Length	Value depends by the communication system.
Last Packet Destination	Value depends by the communication system.

Table 82: Extended Diagnosis > [Folder Name] > IniBatch Status

The task status "Confirmation Result" is bus specific. The other task statuses are rcx-related error codes.

10.5 Code Diagnosis

Code Diagnosis	
Task states	
Name	Value
Info counter	
Warning counter	
Error counter	<i>[The displayed values depend from the corresponding task]</i>
Error level	
Error code	
Parameter	
Line number	
Module	

Figure 77: Extended Diagnosis > [Folder Name] > Code Diagnosis Example Display EtherNet/IP Adapter

Name	Description
Info Counter	Counter for information reports
Warning Counter	Counter for warning reports
Error Counter	Counter for errors
Error Level	Level of the last occurred error
Error Code	Code of the last occurred error
Parameter	Additional information to the error
Line number	Line number inside the software module
Module	Software module

Table 83: Extended Diagnosis > [Folder Name] > Code Diagnosis

10.6 TCPUDP

10.6.1 IP Information

IP Information	
Task states	
Name	Value
Task State	1
Error Counter	10
Last Error	0xC0070037
IP Address	192.168.10.1
Net Mask	255.255.255.0
Gateway	0.0.0.0

Figure 78: Extended Diagnosis > [Folder Name] > IP Information Example Display EtherNet/IP Adapter

Name	Description
Task State	Actual state of the protocol process: 0 = Task not initialized 1 = Task is running 2 = Task initialized 3 = Initialization error
Error Counter	Counter for errors
Last Error	Last occurred error (Description see appropriate manual)
IP Address	IP address of the Slave station.
Net Mask	Network mask of the Slave station.
Gateway	Gateway address of the Slave station.

Table 84: Extended Diagnosis > [Folder Name] > IP Information

10.6.2 IP Packet Counter

IP Packet Counter	
Task states	
Name	Value
Packet Recv TCP	0
Packet Recv UDP	0
Packet Recv ICMP	0
Packet Recv IP Header Err	0
Packet Recv ARP	0
Packet Recv Unknown	0

Figure 79: Extended Diagnosis > [Folder Name] > IP Packet Counter Example Display EtherNet/IP Adapter

Name	Description
Packet Recv TCP	Counter for received TCP packets
Packet Recv UDP	Counter for received UDP packets
Packet Recv ICMP	Counter for received ICMP packets
Packet Recv IP Header Err	Counter for received IP packets with errors
Packet Recv ARP	Counter for received ARP packets
Packet Recv Unknown	Counter for received packets of an unknown type

Table 85: Extended Diagnosis > [Folder Name] > IP Packet Counter

10.6.3 IP Code Diagnosis

IP Code Diagnosis	
Task states	
Name	Value
Information Counter	1
Warning Counter	0
Error Counter	0
Severity Level	Information
Code	0
Parameter	691
Module	TcpTaskF
Line Number	691

Figure 80: Extended Diagnosis > [Folder Name] > IP-Code Diagnosis Example Display EtherNet/IP Adapter

Name	Description
Info Counter	Counter for information reports
Warning Counter	Counter for warning reports
Error Counter	Counter for errors
Severity Level	Level of the last occurred error
Code	Code of the last occurred error
Parameter	Additional information to the error
Module	Software module
Line number	Line number inside the software module

Table 86: Extended Diagnosis > [Folder Name] > IP-Code Diagnosis

10.6.4 TCP_UDP Information

TCP_UDP Information	
Task states	
Name	Value
Task State	1
Error Counter	10
Last Error	0xC0080032

Figure 81: Extended Diagnosis > [Folder Name] > TCP_UDP-Information Example Display EtherNet/IP Adapter

Name	Description
Task State	Actual state of the protocol process: 0 = Task not initialized 1 = Task is running 2 = Task initialized 3 = Initialization error
Error Count	Counter for errors
Last Error	Last occurred error (Description see appropriate manual)

Table 87: Extended Diagnosis > [Folder Name] > TCP_UDP-Information

10.6.5 TCP_UDP Code Diagnosis

TCP_UDP Code Diagnosis	
Task states	
Name	Value
Information Counter	0
Warning Counter	0
Error Counter	0
Severity Level	None
Code	0
Parameter	0
Module	
Line Number	0

Figure 82: Extended Diagnosis > [Folder Name] > TCP_UDP Code Diagnosis Example
Display EtherNet/IP Adapter

Name	Description
Info Counter	Counter for information reports
Warning Counter	Counter for warning reports
Error Counter	Counter for errors
Severity Level	Level of the last occurred error
Code	Code of the last occurred error
Parameter	Additional information to the error
Module	Software module
Line number	Line number inside the software module

Table 88: Extended Diagnosis > [Folder Name] > TCP_UDP Code Diagnosis

10.7 EtherNet/IP Adapter

10.7.1 EIS_ENCAP_TASK

10.7.1.1 Encap Command Counter

Encap Command Counter	
Task states	
Name	Value
NOP	0
List Taarget	0
List Identity	0
List Services	0
List Interfaces	0
Register session	0
Unregister session	0
Send process data	0
Unknown Command	0
Good Reply	0
Error Reply	0

Figure 83: Extended Diagnosis > EIS_ENCAP_TASK > Encap Command Counter

Name	Description
NOP	Counter incoming encapsulation telegrams
List Target	Counter incoming encapsulation telegrams
List Identity	Counter incoming encapsulation telegrams
List Services	Counter incoming encapsulation telegrams
List Interfaces	Counter incoming encapsulation telegrams
Register Session	Counter incoming encapsulation telegrams
Unregister Session	Counter incoming encapsulation telegrams
Process data	Unit Date RR Data telegrams
Unknown Command	Counter incoming encapsulation telegrams
Good Reply	Counter incoming encapsulation telegrams
Error Reply	Counter incoming encapsulation telegrams

Table 89: Extended Diagnosis > EIS_ENCAP_TASK > Encap Command Counter

10.7.1.2 Packet Counter

Packet Counter	
Task states	
Name	Value
ulOpenCnf	12
ulWaitConnCnf	0
ulConnectCnf	0
ulUdpSendCnf	0
ulTcpSendCnf	0
ulCloseCnf	0
ulSetSockOptionCnf	0
ulReceiveInd	0
ulStopInd	0
ulGetCfgCnf	521
ulShutdownInd	0
ulSetCfgCnf	0
ulSetCloseAllCnf	0
ulResetReq	3
ulRespRRReq	0
ulSendRRReq	0
ulSendCl3Req	0
ulCreateTranspReq	0
ulDelTranspReq	0
ulStartTranspReq	0
ulIdnetityReq	0
ulInterfaceReq	0
ulServiceReq	0

Figure 84: Extended Diagnosis > EIS_ENCAP_TASK > Packet Counter

Name	Description
[Service]	Diagnosis counter of the encapsulation layer. Indicates the services processed. (The services of the single packets are described in the API manual.)

Table 90: Extended Diagnosis > EIS_ENCAP_TASK > Packet Counter

10.7.2 EIS_OBJECT_TASK

10.7.2.1 Object Request Counter

Object Request Counter	
Task states	
Name	Value
Identity Get Attribute Single	0
Identity Get Attribute All	0
Identity Reset	0
Identity unknown command	0
Assembly Get Attribute Single	0
Assembly Set Attribute Single	0
Assembly unknown command	0
Connection Manager Get Attribute Single	0
Connection Manager Forward Open	0
Connection Manager Forward Close	0
Connection Manager unknown command	0
CoCo Get Attribute Single	0
CoCo Get Attribute All	0
CoCo Set Attribute Single	0
CoCo Set Attribute All	0
CoCo Create	0
CoCo Delete	0
CoCo Restore	0
CoCo Change Start	0
CoCo Audit Change	0
CoCo Change Complete	0
CoCo Kick Timer	0

Figure 85: Extended Diagnosis > EIS_OBJECT_TASK > Object Request Counter

The **Object Request Counter** table indicates the respective number of services sent to different objects.

Name	Description
Identity Get Attribute Single	Counter for the <i>Get Attribute Single</i> services to the <i>identity</i> object.
Identity Get Attribute All	Counter for the <i>Get Attribute All</i> services to the <i>identity</i> object.
Identity Reset	Counter for the <i>Reset</i> services to the <i>identity</i> object.
Identity unknown Command	Counter for the <i>Unknown Command</i> services to the <i>identity</i> object.
Assembly Get Attribute Single	Counter for the <i>Get Attribute Single</i> services to the <i>assembly</i> object.
[Object] [Service]	Counter for the [Object] services to the [Service] object.

Table 91: Extended Diagnosis > EIS_OBJECT_TASK > Object Request Counter

10.7.2.2 Outgoing Connection

Outgoing Connection	
Task states	
Name	Value
Issue Open	0
Issue Close	0
Open Connections	0x00000000
Last error instance	0
Last GRC	0x0
Last ERC	0x0

Figure 86: Extended Diagnosis > EIS_OBJECT_TASK > Outgoing Connection

Name	Description
Issue Open	Counter for open issues
Issue Close	Counter for closed issues
Open Connections	Actual open connection
Last error instance	Last error instance
Last GRC	Last General Status Code
Last ERC	Last Extended Status Code

Table 92: Extended Diagnosis > EIS_OBJECT_TASK > Outgoing Connection

10.7.2.3 Ingoing Connection

Ingoing Connection	
Task states	
Name	Value
Last Error Address	0x00000000
Last GRC	0x0
Last ERC	0x0
Actual Connection	0

Figure 87: Extended Diagnosis > EIS_OBJECT_TASK > Ingoing Connection

Name	Description
Last Errors Address	IP Address
Last GRC	Last General Status Code
Last ERC	Last Extended Status Code
Actual Connection	Actual open connection

Table 93: Extended Diagnosis > EIS_OBJECT_TASK > Ingoing Connection

10.7.3 EIS_AP_TASK

10.7.3.1 Common Diagnostic

Common Diagnosis	
Task states	
Name	Value
State field	7
Bus state	4
Communication error	0x00000000
Version	1
Watchdog time	1000
Protocol class	0:5 1:2
Error counter	0

Figure 88: Extended Diagnosis > EIS_AP_TASK > Common Diagnostic

Name	Description
Status field	Communication change of state
Bus state	Communication state
Communication Error	Unique error number according to protocol stack (not supported yet)
Version	Version number of this diagnosis structure
Watchdog time	Configured watchdog time
Protocol Class	Protocol class: MASTER, SLAVE, CLIENT, SERVER, GATEWAY
Error Counter	Total number of detected error since power-up or reset

Table 94: Extended Diagnosis > EIS_AP_TASK > Common Diagnostic

10.7.3.2 General State

General Status	
Task states	
Name	Value
Error code	0x00000000

Figure 89: Extended Diagnosis > EIS_AP_TASK > General State

Name	Description
Error Code	Code of the last occurred error

Table 95: Extended Diagnosis > EIS_AP_TASK > General State

10.8 Open Modbus/TCP

10.8.1 OMB

10.8.1.1 OMB Information

OMB Information	
Task states	
Name	Value
Task State	Wait configuration
Error Count	0
Last Error	0x00000000
Socket Status	0x00000000
Cyclic Event Count	6132
Idle Count	0

Figure 90: Extended Diagnosis > OMB > OMB Information

Name	Description
Task State	Actual state of the protocol process: 0 = Task not initialized 1 = Task is running 2 = Task initialized 3 = Initialization error 4 = Waiting for configuration
Error Count	Counter for errors
Last Error	Last occurred error (Description see appropriate manual)
Socket Status	The socket status informs about the TCP sockets. More exactly, it contains the information whether sockets are open or closed in a bit-coded manner. The coding is as follows: The socket number corresponds to the position of the bit within the variable, i.e. bit 0 represents socket # 0 and bit 15 represents socket # 15. The coding is in that way that a bit value of 1 means the respective socket is open and a value of 0 indicates it is not open.
Cyclic Event Count	The cyclic event counter represents the number of cyclic events that have occurred.
Idle Count	The idle count is currently not used.

Table 96: Extended Diagnosis > OMB > OMB Information

10.8.1.2 OMB Client

OMB Client	
Task states	
Name	Value
Messages Send to User	0
Messages Recv from User	0
FC1 Count	0
FC2 Count	0
FC3 Count	0
FC4 Count	0
FC5 Count	0
FC6 Count	0
FC7 Count	0
FC15 Count	0
FC16 Count	0
FC23 Count	0

Figure 91: Extended Diagnosis > OMB > OMB Client

Name	Description
Messages Send to User	Number of messages send from the OMB client to the user.
Messages Recv from User	Number of messages received from the user.
FC[N] Count	Number of access events to the respective function code. FC = Function code Possible values for N = 0 1, 2, 3, 4, 5, 6, 7, 15, 16, 23

Table 97: Extended Diagnosis > OMB > OMB Client

10.8.1.3 OMB Server

OMB Server	
Task states	
Name	Value
Messages Send to TCP task	0
Messages Recv from TCP task	0
FC1 Count	0
FC2 Count	0
FC3 Count	0
FC4 Count	0
FC5 Count	0
FC6 Count	0
FC7 Count	0
FC15 Count	0
FC16 Count	0
FC23 Count	0

Figure 92: Extended Diagnosis > OMB > OMB Server

Name	Description
Messages Send to TCP task	Number of messages send from the OMB server to the TCP task.
Messages Recv from TCP task	Number of messages received from the TCP task.
FC[N] Count	Number of access events to the respective function code. FC = Function code Possible values for N = 0 1, 2, 3, 4, 5, 6, 7, 15, 16, 23

Table 98: Extended Diagnosis > OMB > OMB Server

10.8.1.4 OMB IO

OMB IO	
Task states	
Name	Value
Messages Send to TCP task	0
Messages Recv from TCP task	0
FC1 Count	0
FC2 Count	0
FC3 Count	0
FC4 Count	0
FC5 Count	0
FC6 Count	0
FC7 Count	0
FC15 Count	0
FC16 Count	0
FC23 Count	0
Modbus address	0
Data count	0
Function code	0
Data	0x00000000x00000000x00000000
Error Count	0
Last Error	0x00000000

Figure 93: Extended Diagnosis > OMB > OMB IO

Name	Description
Messages Send to TCP task	Number of messages send from the OMB server to the TCP task.
Messages Recv from TCP task	Number of messages received from the TCP task.
FC[N] Count	Number of access events to the respective function code. FC = Function code Possible values for N = 0 1, 2, 3, 4, 5, 6, 7, 15, 16, 23
Modbus address	Address within the Modbus Data model or memory map (Range 0 ... 65535).
Data count	Data counter
Function code	The Modbus standard function codes for send and receive operations: FC1: Read coils FC2: Read input discretes FC3: Read multiple registers FC4: Read input registers FC5: Write coil FC6: Write single register FC15 : Force multiple coils FC16: Write multiple registers FC23: Read/Write multiple registers
Data	The first data of the last sent function code (telegram) are displayed.
Error Count	Counter for errors
Last Error	Last occurred error (Description see appropriate manual)

Table 99: Extended Diagnosis > OMB > OMB IO

10.8.1.5 OMB Code Diagnosis

Code Diagnosis	
Task states	
Name	Value
Info counter	
Warning counter	
Error counter	[The displayed values depend from the corresponding task]
Error level	
Error code	
Parameter	
Line number	
Module	

Figure 94: Extended Diagnosis > OMB > OMB Code Diagnosis Example Display

Name	Description
Information Counter	Counter for information reports
Warning Counter	Counter for warning reports
Error Counter	Counter for errors
Severity Level	Level of the last occurred error 0 = None 1 = Information 2 = Warning 3 = Error 4 = Fatal Error
Code	Code of the last occurred error
Parameter	Additional information to the error
Module	Software module
Line number	Line number inside the software module

Table 100: Extended Diagnosis > OMB > OMB Code Diagnosis

10.9 PROFINET IO Device

10.9.1 PNS_IF

10.9.1.1 PROFINET Stack State

PROFINET Stack State	
Task states	
Name	Value
Summary	0x00
Device Information is set	false
PROFINET Stack is started	false
Device Instance is opened	false
API is added	false
Module 0 is plugged	false
Module 0 and Submodule 1 are pl...	false
Network Communication is allowed	false
Network Communication is enabled	false
Last Error Code of PROFINET Stack	0x00000000
Last Error Code of RCX/API Task	The Device is not connected to a network
Configuration State	Not configured
Link State	No Physical Link

Figure 95: Extended Diagnosis > PNS_IF > PROFINET Stack State

Name	Description
Summary	Summary of the PROFINET IO stack status
Device information is set	Manufacturer information about the device, which is defined in the GSDML file.
PROFINET stack is started	Status of the PROFINET IO stack: started
Device instance is opened	Device instance of the PROFINET IO stack: opened
API is added	API of the PROFINET IO stack: opened
Module 0 is plugged	Module 0 of the PROFINET IO stack: plugged
Module 0 and Submodule 1 are plugged	Module 0 and Submodule 1 of the PROFINET IO stack: plugged
Network Communication is allowed	Network Communication: allowed
Network Communication is enabled	Network Communication: enabled
Last Error Code of PROFINET Stack	Last occurred error of the PROFINET IO stack
Last Error Code of RCX/API Task	Last occurred error of the RCX/API task
Configuration State	Configuration of the PROFINET IO stack
Link State	State of the physical network connection of the PROFINET IO stack

Table 101: Extended Diagnosis > PNS_IF > PROFINET Stack State

10.9.1.2 Station Description

Station Description	
Task states	
Name	Value
Station name	nxsb100pns
Station type	Default.Station.Type
IP Address	0.0.0.0
Network mask	0.0.0.0
Gateway address	0.0.0.0
New configuration is available	0x00
New station name	no
Save Station name remanently	no
New station type	no
Save Station type remanently	no
New IP configuration	no
Save IP configuration remanently	no

Figure 96: Extended Diagnosis > PNS_IF > Station Description

Name	Description
Station name	The Station name contains the name of the station provided by engineering.
Station type	The Station type contains the type of the station provided by manufacturer of the device.
IP Address	Valid IP address for the device
Network mask	Valid Network mask for the device
Gateway address	Valid Gateway address for the device
New configuration is available	From the following parameters at least one has changed: Station name, station type, IP configuration.
New station name	Station name has changed.
Save Station name remanently	The new station name shall be stored remanently.
New station type	Station typehas changed.
Save Station type remanently	The new station type shall be stored remanently.
New IP configuration	IP configuration has changed.
Save IP configuration remanently	The new IP configuration shall be stored remanently.

Table 102: Extended Diagnosis > PNS_IF > Station Description

10.10 IO Monitor

The **IO Monitor** serves for test and diagnosis purposes. It provides to view data of the process data image and to change output data easily. The display is always in a Byte manner.



Note: Only change and write output data, if you know that no plant disturbances are caused by this. All output data written by the IO Monitor are transmitted at the bus and have effect on subordinate drives, IO etc.

IO Monitor

Columns: 10 Display mode: Decimal

Input data

Offset: 5 Go

	0	1	2	3	4	5	6	7	8	9
0	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-
40	-	-	-	-	-	-	-	-	-	-
50	-	-	-	-	-	-	-	-	-	-
60	-	-	-	-	-	-	-	-	-	-
70	-	-	-	-	-	-	-	-	-	-
80	-	-	-	-	-	-	-	-	-	-
90	-	-	-	-	-	-	-	-	-	-

11:50:54: COM-flag not set Clear

Output data

Offset: 33 Go

	0	1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0	0	0

11:51:34: COM-flag not set Update

Figure 97: IO Monitor

Columns switches the number of columns.

Display Mode switches the representation of the input and output data between decimal and hexadecimal.

Offset / Go moves the indication of the data to the entered offset value.

Clear clears displayed error messages.

➤ Enter the output value and select the button **Update**.

➤ Always the data of the process image are displayed, also when these Bytes have not been reserved by the configuration.

11 Troubleshooting

In case of any error, please follow the hints given here in order to solve the problem:

General

- Check, if the requirements for cifX card operation are served.



Note: Upgrade older versions of the **cifX Device Driver** necessarily on the version **V1.0.x.x**.

Further information on this, refer to page 44, in the section titled *Requirements for Operation*.

LINK-LEDs

- Check using the LINK LEDs status, if a connection to the Ethernet is established.

Further information on this, refer to page 221, in the chapter titled *LEDs*.

Cable

- Check that the pinning of the used cable is correct.

Configuration

- Check the configuration in the Master and the Slave device. The configuration has to match.

Diagnostic using the netX Configuration Tool

With the menu **netX Configuration Tool > Diagnostics**, the diagnostic information of the device is shown. The shown diagnostic information depends on the used protocol.

Diagnostic using the Configuration Software SYCON.net

With the menu **Online > Diagnosis**, the diagnostic information of the device is shown. The shown diagnostic information depends on the used protocol.



Note: More information about the device diagnosis and its functions you find in the operating manual of the corresponding real-Time Ethernet system. Therefore refer to section *Documentations cifX Cards* on page 23.

11.1 Failure in 10 MBit/s Half Duplex Mode and Workaround

Affected Hardware

Hardware with the communications controller netX 50, netX 100 or netX 500; netX/Internal PHYs.

When can this Failure occur?

When using standard Ethernet communication with 10 MBit/s half duplex mode, the PHY gets stuck in case of network collisions. Then no further network communication is possible. Only device power cycling allows Ethernet communication again.

This problem can only occur with Ethernet TCP/UDP IP, EtherNet/IP or Modbus TCP protocols when using hubs at 10 MBit/s. The issue described above is not applicable for protocols which use 100 MBit/s or full duplex mode.

Solution / Workaround:

Do not use 10 MBit/s-only hubs. Use either switches or 10/100 MBit/s Dual Speed hubs, to make sure the netX Ethernet ports are connected with 100 MBit/s or in full duplex mode.

This erratum is fixed with all components of the 'Y' charge (9 digit charge number shows 'Y' at position 5 (nnnnYnnnn)).

Reference

"Summary of 10BT problem on EthernetPHY",
Renesas Electronics Europe, April 27, 2010

12 LEDs

12.1 Overview LEDs



Note: The meaning of the communication status and the RJ45 LEDs at the cifX card is defined by the loaded cifX firmware of the protocol.

LED Naming in the Device Drawing		LED Naming by Protocol							
		EtherCAT Master	EtherCAT Slave	EtherNet/IP	Open Modbus/TCP	Powerlink	PROFINET IO	SERCOS III Master	SERCOS III Slave
SYS (Systemstatus)  (yellow/green)		SYS	SYS	SYS	SYS	SYS	SYS	SYS	SYS
COM 0 (Communication Status)  (red/green)  (orange = red/green simultaneously)		RUN (Run)	RUN (Run)	MS (Module Status)	RUN (Run)	BS (Bus Status)	SF (System Failure)	STA (Status)	S3 (Status/Error)
COM 1 (Communication Status)  (red/green)		ERR (Error)	ERR (Error)	NS (Network Status)	ERR (Error)	BE (Bus Error)	BF (Bus Failure)	ERR (Error)	-
RJ45 Ch0	 (green)	LINK (Link)	L/A IN (Link/Activity Input)	LINK (Link)	LINK (Link)	L/A (Link/Activity)	LINK (Link)	L/A (Link/Activity)	L/A (Link/Activity)
	 (yellow)	ACT (Activity)	-	ACT (Activity)	ACT (Activity)	-	RX/TX (Receive/Transmit)	-	-
RJ45 Ch1	 (green)	-	L/A OUT (Link/Activity Output)	LINK (Link)	LINK (Link)	L/A (Link/Activity)	LINK (Link)	L/A (Link/Activity)	L/A (Link/Activity)
	 (yellow)	-	-	ACT (Activity)	ACT (Activity)	-	RX/TX (Receive/Transmit)	-	-

Table 103: Overview LEDs Real-Time Ethernet Systems

12.2 System LED

The subsequent table describes the meaning of the system LED.

LED	Color	State	Meaning
SYS	Duo LED yellow/green		
	 (green)	On	Operating System running
	 (yellow)	static	Bootloader is waiting for software
	-	Off	Power supply for the device is missing or hardware defect.

Table 104: System LED

12.3 LEDs EtherCAT Master

The subsequent table describes the meaning of the LEDs for the cifX card Real-Time Ethernet when the firmware of the EtherCAT Master protocol is loaded to the cifX card.

LED	Color	State	Meaning
RUN Name in the device drawing: COM 0	Duo LED red/green		
	-	Off	INIT : The device is in state INIT
	 (green)	Blinking	PRE-OPERATIONAL : The device is in PRE-OPERATIONAL state
	 (green)	Flickering	BOOT : Device is in Boot mode
	 (green)	Single Flash	SAFE-OPERATIONAL : The device is in SAFE-OPERATIONAL state
	 (green)	On	OPERATIONAL : The device is in OPERATIONAL state
ERR Name in the device drawing: COM 1	Duo LED red/green		
	-	Off	Master has no errors
LINK/ RJ45 Ch0	 (red)	On	Master has detected a communication error. The error is indicated in the DPM
	LED green		
	 (green)	On	A link is established
ACT/ RJ45 Ch0	-	Off	No link established
	LED yellow		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 105: LEDs EtherCAT Master

LED State Definition for EtherCAT Master for the RUN and ERR LEDs

Indicator state	Definition
On	The indicator is constantly on.
Off	The indicator is constantly off.
Blinking	The indicator turns on and off with a frequency of 2,5 Hz: on for 200 ms, followed by off for 200 ms.
Flickering	The indicator turns on and off with a frequency of approximately 10 Hz: on for approximately 50 ms, followed by off for 50 ms.
Single Flash	The indicator shows one short flash (200 ms) followed by a long off phase (1,000 ms).
Double Flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).

Table 106: LED State Definition for EtherCAT Master for the RUN and ERR LEDs

12.4 LEDs EtherCAT Slave

The subsequent table describes the meaning of the LEDs for the cifX card Real-Time Ethernet when the firmware of the EtherCAT Slave protocol is loaded to the cifX card.

LED	Color	State	Meaning
RUN Name in the device drawing: COM 0	Duo LED red/green		
	-	Off	INIT: The device is in state INIT
	 (green)	Blinking	PRE-OPERATIONAL: The device is in state PRE-OPERATIONAL
	 (green)	Single Flash	SAFE-OPERATIONAL: The device is in state SAFE-OPERATIONAL
	 (green)	On	OPERATIONAL: The device is in state OPERATIONAL
ERR Name in the device drawing: COM 1	Duo LED red/green		
	-	Off	No error: The EtherCAT communication of the device is in working condition
	 (red)	Blinking	Invalid Configuration: General Configuration Error (Example: State change commanded by master is impossible due to register or object settings.)
	 (red)	Single Flash	Unsolicited State Change: Slave device application has changed the EtherCAT state autonomously: Parameter "Change" in the AL status register is set to 0x01:change/error (Example: Synchronization Error, device enters Safe-Operational automatically.)
	 (red)	Double Flash	Application Watchdog Timeout: An application watchdog timeout has occurred. (Example: Sync Manager Watchdog timeout)
	 (red)	On	PDI Watchdog Timeout: A PDI Watchdog timeout has occurred (Example: Application controller is not responding any more)
L/A IN/ RJ45 Ch0 L/A OUT/ RJ45 Ch1	LED green		
	 (green)	On	A link is established
	 (green)	Flashing	The device sends/receives Ethernet frames
	-	Off	No link established
RJ45 Ch0 RJ45 Ch1	LED yellow		
	 (yellow)	-	-

Table 107: LEDs EtherCAT Slave

LED State Definition for EtherCAT Slave for the RUN and ERR LEDs

Indicator state	Definition
On	The indicator is constantly on.
Off	The indicator is constantly off.
Blinking	The indicator turns on and off with a frequency of 2,5 Hz: on for 200 ms, followed by off for 200 ms.
Single Flash	The indicator shows one short flash (200 ms) followed by a long off phase (1,000 ms).
Double Flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).

Table 108: LED State Definition for EtherCAT Slave for the RUN and ERR LEDs

12.5 LEDs EtherNet/IP Scanner (Master)

The subsequent table describes the meaning of the LEDs for the cifX card Real-Time Ethernet when the firmware of the EtherNet/IP Scanner (Master) protocol is loaded to the cifX card.

LED	Color	State	Meaning
MS Name in the device drawing: COM 0	Duo LED red/green		
	 (green)	On	Device operational: If the device is operating correctly, the module status indicator shall be steady green.
	 (green)	Flashing	Standby: If the device has not been configured, the module status indicator shall be flashing green.
	 (red)	On	Major fault: If the device has detected a non-recoverable major fault, the module status indicator shall be steady red.
	 (red)	Flashing	Minor fault*: If the device has detected a recoverable minor fault, the module status indicator shall be flashing red. NOTE: An incorrect or inconsistent configuration would be considered a minor fault. (*for future use)
	 (red/green)	Flashing	Self-test: While the device is performing its power up testing, the module status indicator shall be flashing green/red.
	-	Off	No power: If no power is supplied to the device, the module status indicator shall be steady off.
NS Name in the device drawing: COM 1	Duo LED red/green		
	 (green)	On	Connected: If the device has at least one established connection (even to the Message Router), the network status indicator shall be steady green.
	 (green)	Flashing	No connections: If the device has no established connections, but has obtained an IP address, the network status indicator shall be flashing green.
	 (red)	On	Duplicate IP*: If the device has detected that its IP address is already in use, the network status indicator shall be steady red. (*For future use)
	 (red)	Flashing	Connection timeout: If one or more of the connections in which this device is the target has timed out, the network status indicator shall be flashing red. This shall be left only if all timed out connections are reestablished or if the device is reset.
	 (red/green)	Flashing	Self-test: While the device is performing its power up testing, the network status indicator shall be flashing green/red.
	-	Off	Not powered, no IP address: If the device does not have an IP address (or is powered off), the network status indicator shall be steady off.
LINK/RJ45 Ch0 & Ch1	LED green		
	 (green)	On	A connection to the Ethernet exists
	-	Off	The device has no connection to the Ethernet
ACT/RJ45 Ch0 & Ch1	LED yellow		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 109: LEDs EtherNet/IP Scanner (Master)

12.6 LEDs EtherNet/IP Adapter (Slave)

The subsequent table describes the meaning of the LEDs for the cifX card Real-Time Ethernet when the firmware of the EtherNet/IP Adapter (Slave) protocol is loaded to the cifX card.

LED	Color	State	Meaning
MS Name in the device drawing: COM 0	Duo LED red/green		
	 (green)	On	Device operational: If the device is operating correctly, the module status indicator shall be steady green.
	 (green)	Flashing	Standby: If the device has not been configured, the module status indicator shall be flashing green.
	 (red)	On	Major fault: If the device has detected a non-recoverable major fault, the module status indicator shall be steady red.
	 (red)	Flashing	Minor fault*: If the device has detected a recoverable minor fault, the module status indicator shall be flashing red. NOTE: An incorrect or inconsistent configuration would be considered a minor fault.
	 (red/green)	Flashing	Self-test: While the device is performing its power up testing, the module status indicator shall be flashing green/red.
	-	Off	No power: If no power is supplied to the device, the module status indicator shall be steady off.
NS Name in the device drawing: COM 1	Duo LED red/green		
	 (green)	On	Connected: If the device has at least one established connection (even to the Message Router), the network status indicator shall be steady green.
	 (green)	Flashing	No connections: If the device has no established connections, but has obtained an IP address, the network status indicator shall be flashing green.
	 (red)	On	Duplicate IP*: If the device has detected that its IP address is already in use, the network status indicator shall be steady red.
	 (red)	Flashing	Connection timeout: If one or more of the connections in which this device is the target has timed out, the network status indicator shall be flashing red. This shall be left only if all timed out connections are reestablished or if the device is reset.
	 (red/green)	Flashing	Self-test: While the device is performing its power up testing, the network status indicator shall be flashing green/red.
	-	Off	Not powered, no IP address: If the device does not have an IP address (or is powered off), the network status indicator shall be steady off.
LINK/RJ45 Ch0 & Ch1	LED green		
	 (green)	On	A connection to the Ethernet exists
	-	Off	The device has no connection to the Ethernet
ACT/RJ45 Ch0 & Ch1	LED yellow		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 110: LEDs EtherNet/IP Adapter (Slave) (* For future use)

12.7 LEDs Open Modbus/TCP

The subsequent table describes the meaning of the LEDs for the cifX card Real-Time Ethernet when the firmware of the Open Modbus/TCP protocol is loaded to the cifX card.

LED	Color	State	Meaning
RUN Name in the device drawing: COM 0	Duo LED red/green		
	-	Off	Not Ready OMB task is not ready
	 (green)	Flashing cyclic with 1Hz	Ready, not configured yet OMB task is ready and not configured yet
	 (green)	Flashing cyclic with 5Hz	Waiting for Communication: OMB task is configured
ERR Name in the device drawing: COM 1	 (green)	On	Connected: OMB task has communication – at least one TCP connection is established
	Duo LED red/green		
	-	Off	No communication error
	 (red)	Flashing cyclic with 2Hz (On/Off Ratio = 25 %)	System error
	 (red)	On	Communication error active
LINK/RJ 45 Ch0 & Ch1	LED green		
	 (green)	On	A connection to the Ethernet exists
	-	Off	The device has no connection to the Ethernet
ACT/RJ 45 Ch0 & Ch1	LED yellow		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 111: LEDs Open Modbus/TCP

12.8 LEDs Powerlink Controlled Node/Slave

The subsequent table describes the meaning of the LEDs for the cifX card Real-Time Ethernet when the firmware of the Powerlink Controlled Node/Slave protocol is loaded to the cifX card.

LED	Color	State	Meaning
BS Name in the device drawing: COM 0	Duo LED red/green		
	-	Off	Slave initializing
	 (green)	Flickering	Slave is in Basic Ethernet state
		Single Flash	Slave is in Pre-Operational 1
		Double Flash	Slave is in Pre-Operational 2
		Triple Flash	Slave is in ReadyToOperate
		On	Slave is Operational
		Blinking	Slave is Stopped
BE Name in the device drawing: COM 1	Duo LED red/green		
	-	Off	Slave has no error
	 (red)	On	Slave has detected an error
LIA/ RJ45 Ch0 & Ch1	LED green		
	 (green)	On	Link: A connection to the Ethernet exists
	 (green)	Flashing	Activity: The device sends/receives Ethernet frames
	-	Off	The device has no connection to the Ethernet
RJ45 Ch0 & Ch1	LED yellow		
	 (yellow)	-	-

Table 112: LEDs Powerlink Controlled Node/Slave

LED State Definition for Powerlink Controlled Node/Slave for the BS/BE LEDs

Indicator state	Definition
On	The indicator is constantly on.
Off	The indicator is constantly off.
Blinking	The indicator turns on and off with a frequency of approximately 2,5 Hz: on for approximately 200 ms, followed by off for 200 ms. Red and green LEDs shall be on alternately.
Flickering	The indicator turns on and off with a frequency of approximately 10 Hz: on for approximately 50 ms, followed by off for 50 ms. Red and green LEDs shall be on alternately.
Single Flash	The indicator shows one short flash (approximately 200 ms) followed by a long off phase (approximately 1,000 ms).
Double Flash	The indicator shows a sequence of two short flashes (each approximately 200 ms), separated by a short off phase (approximately 200 ms). The sequence is finished by a long off phase (approximately 1,000 ms).
Triple Flash	The indicator shows a sequence of three short flashes (each approximately 200 ms), separated by a short off phase (approximately 200 ms). The sequence is finished by a long off phase (approximately 1,000 ms).

Table 113: LED State Definition for Powerlink Controlled Node/Slave for the BS/BE LEDs

12.9 LEDs PROFINET IO-RT Controller

The subsequent table describes the meaning of the LEDs for the cifX card Real-Time Ethernet when the firmware of the PROFINET IO-RT Controller protocol is loaded to the cifX card.

LED	Color	State	Meaning
SF Name in the device drawing: COM 0	Duo LED red/green		
	 (red)	On	(together with BF „red ON“) No valid Master license
	 (red)	Flashing cyclic at 2 Hz	System error: Invalid configuration
	-	Off	No error
BF Name in the device drawing: COM 1	Duo LED red/green		
	 (red)	On	No Connection: No Link. or (together with SF „red ON“) No valid Master license
	 (red)	Flashing cyclic at 2 Hz	Configuration fault: not all configured IO-Devices are connected.
	-	Off	No error
LINK/RJ45 Ch0 & Ch1	LED green		
	 (green)	On	A connection to the Ethernet exists
	-	Off	The device has no connection to the Ethernet
RX/TX/RJ45 Ch0 & Ch1	LED yellow		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 114: LEDs PROFINET IO-RT Controller

12.10 LEDs PROFINET IO-RT-Device

The subsequent table describes the meaning of the LEDs for the cifX card Real-Time Ethernet when the firmware of the PROFINET IO-RT-Device protocol is loaded to the cifX card.

LED	Color	State	Meaning
SF Name in the device drawing: COM 0	Duo LED red/green		
	 (red)	On	Watchdog timeout; channel, generic or extended diagnosis present; system error
	 (red)	Flashing cyclic at 2 Hz (for 3 sec.)	DCP signal service is initiated via the bus
	-	Off	No error
BF Name in the device drawing: COM 1	Duo LED red/green		
	 (red)	On	No configuration; or low speed physical link; or no physical link
	 (red)	Flashing cyclic at 2 Hz	No data exchange
	-	Off	No error
LINK/RJ45 Ch0 & Ch1	LED green		
	 (green)	On	A connection to the Ethernet exists
	-	Off	The device has no connection to the Ethernet
RX/TX/RJ45 Ch0 & Ch1	LED yellow		
	 (yellow)	Flashing	The device sends/receives Ethernet frames

Table 115: LEDs PROFINET IO-RT-Device

12.11 LEDs SERCOS III Master

The subsequent table describes the meaning of the LEDs for the cifX card Real-Time Ethernet when the firmware of the SERCOS III Master protocol is loaded to the cifX card.

LED	Color	State	Meaning
STA Name in the device drawing: COM 0	Duo LED red/green		
	 (green)	Blinking	CP0: Communication phase 0
	 (green)	Flickering	Master isn't configured and is in NRT. After a status change this isn't indicated again
	 (green)	Single Flash	CP1: Communication phase 1
	 (green)	Double Flash	CP2: Communication phase 2
	 (green)	Triple Flash	CP3: Communication phase 3
	 (green)	On	CP4: Communication phase 4
	-	Off	NRT: Non Real-time Mode
ERR Name in the device drawing: COM 1	Duo LED red/green		
	 (red)	Blinking	Error in the configuration database.
	 (red)	Flickering	Boot-up was stopped due to an error.
	 (red)	Single Flickering	Channel Init was executed at the Master.
	 (red)	Quadruple Flash	No Master license present in the device
	 (red)	Triple Flash	DPM Watchdog has expired.
	 (red)	Double Flash	Internal Stop of the bus cycle
	 (red)	Single Flash	Bus Sync Error Threshold
L/A/RJ45 Ch0 & Ch1	LED green		
	 (green)	On	Link: A connection to the Ethernet exists
	 (green)	Flashing	Activity: The device sends/receives Ethernet frames
RJ45 Ch0 & Ch1	-	Off	The device has no connection to the Ethernet
	LED yellow		
	 (yellow)	-	-

Table 116: LEDs SERCOS III Master

LED State Definition for SERCOS III Master for the STA and ERR LEDs

Indicator state	Definition
Off	The indicator is constantly off.
Blinking	The indicator turns on and off with a frequency of 2,5 Hz: on for 200 ms, followed by off for 200 ms.
Single Flickering	The indicator turns on and off with a frequency of approximately 10 Hz: on for approximately 50 ms, followed by off for 50 ms.
Flickering	The indicator turns on and off once: on for approximately 50 ms, followed by off for 50 ms.
Single Flash	The indicator shows one short flash (200 ms) followed by a long off phase (1,000 ms).
Double Flash	The indicator shows a sequence of two short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Triple Flash	The indicator shows a sequence of three short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).
Quadruple Flash	The indicator shows a sequence of four short flashes (each 200 ms), separated by a short off phase (200 ms). The sequence is finished by a long off phase (1,000 ms).

Table 117: LED State Definition for SERCOS III Master for the STA and ERR LEDs

12.12 LEDs SERCOS III Slave

The subsequent table describes the meaning of the LEDs for the cifX card Real-Time Ethernet when the firmware of the SERCOS III Slave protocol is loaded to the cifX card.

LED	Color	State	Meaning
STA Name in the device drawing: COM 0	Duo LED red/green/orange (orange = red/green simultaneously)		
	 (green)	On	CP4: Communication phase 4, Normal operation, no error
	 (green)	Flashing (4 Hz)	Loopback: The network state has changed from „fast-forward“ to „loopback“.
	 (red/green)	Flashing (4 Hz), <i>The LED flashes at least for 2 seconds from red to green.</i>	Communication Error: Depends on IDN S-0-1003 (for details refer to SERCOS III Slave Protocol API . pdf on the product DVD). Shows how long the Master may in the communication phases CP3 and CP4 not received Master SYNC telegrams.
	 (red)	On	SIII C1D: Error detected according to Sercos III Cass 1 Diagnosis.
	 (orange)	On	CP0 ... CP3: Communication phase 0 to Communication phase 3
	 (orange)	Flashing (4 Hz)	Identification: Bit 15 in the Slave device control that indicates remote address allocation or configuration errors between Master and Slaves (for details refer to SERCOS III Slave Protocol API . pdf on the product DVD).
	-	Off	No SERCOS III Communication
Name in the device drawing: COM 1	Duo LED red/green		
	-	-	This LED is not used.
L/A/RJ45 Ch0 & Ch1	LED green		
	 (green)	On	Link: A connection to the Ethernet exists
	 (green)	Flashing	Activity: The device sends/receives Ethernet frames
	-	Off	The device has no connection to the Ethernet
RJ45 Ch0 & Ch1	LED yellow		
	 (yellow)	-	-

Table 118: LEDs SERCOS III Slave

LED State Definition for SERCOS III Slave for the S3 LED

Indicator state	Definition
On	The indicator is constantly on.
Off	The indicator is constantly off.
Flashing (4 Hz)	The indicator turns on and off with a frequency of 4 Hz: on for appr. 125 ms, followed by off for appr. 125 ms.

Table 119: LED State Definition for SERCOS III Slave for the S3 LED

13 Technical Data

13.1 Technical Data cifX Cards Real-Time Ethernet



Note: All technical data are temporarily and can be altered without notice.

13.1.1 CIFX 50-RE

Item	CIFX 50-RE
System Interface	PCI, 32-Bit width for the data access to the Dual-Port Memory (DPM), or DMA (Direct Memory Access)
Dual-Port Memory Size	64 KBytes
Function	Communication interface with PCI and Real-Time Ethernet interface
Communication	Determined by the loaded firmware
Protocols	EtherCAT Master, EtherCAT Slave, EtherNet/IP-Scanner (Master), EtherNet/IP-Adapter (Slave), Open Modbus/TCP, Powerlink Controlled Node/Slave, PROFINET IO-Controller, PROFINET IO-Device, SERCOS III Master, SERCOS III Slave
Ethernet Frame Types	Ethernet II
Processor	netX 500
LEDs	SYS, COM 0, COM 1, 2x Link, 2x Activity (For more information refer to section <i>LEDs</i> beginning from page 221.)
Configuration Software Real-Time Ethernet Master	SYCONnet
Configuration Software Real-Time Ethernet Slave	netX Configuration Tool
Transmission Rate	10/100 MBit/s, Auto-Negotiation, Cross-Over, Halfduplex/Full duplex (100 MBit/s) Depending on used firmware
Ethernet Interface	RJ45 Socket, 10 Base-T, 100 Base-TX, potential free
Power Supply	+3.3 V dc $\pm 5\%$ /max. 650 mA
Dimensions (L x W x D)	120,0 x 86 x 18,5 mm (B = 86 as with rotary switch)
Operating Temperature	-20 °C ... +55 °C
Environement	The device must be used in a pollution degree 2 environment.

Table 120: Technical Data CIFX 50-RE

13.1.2 CIFX 50E-RE

Item	CIFX 50E-RE
System Interface	PCI-Express, Single-Lane Port, 32-Bit width for the data access to the Dual-Port Memory (DPM)
Dual-Port Memory Size	64 KBytes
Function	Communication interface with PCI-Express and Real-Time Ethernet interface
Communication	Determined by the loaded firmware
Protocols	EtherCAT Master, EtherCAT Slave, EtherNet/IP-Scanner (Master), EtherNet/IP-Adapter (Slave), Open Modbus/TCP, Powerlink Controlled Node/Slave, PROFINET IO-Controller, PROFINET IO-Device, SERCOS III Master, SERCOS III Slave
Ethernet Frame Types	Ethernet II
Processor	netX 500
LEDs	SYS, COM 0, COM 1, 2x Link, 2x Activity (For more information refer to section <i>LEDs</i> beginning from page 221.)
Configuration Software Real-Time Ethernet Master	SYCONnet
Configuration Software Real-Time Ethernet Slave	netX Configuration Tool
Transmission Rate	10/100 MBit/s, Auto-Negotiation, Cross-Over, Halfduplex/Full duplex (100 MBit/s) Depending on used firmware
Ethernet Interface	RJ45 Socket, 10 Base-T, 100 Base-TX, potential free
Power Supply	+3.3 V dc ± 5 %/max. 800 mA
Dimensions (L x W x D)	120,0 x 73,2 x 18,5 mm (B = 73,2 as without rotary switch)
Operating Temperature	0 °C ... +55 °C
Environement	The device must be used in a pollution degree 2 environment.

Table 121: Technical Data CIFX 50E-RE

13.1.3 CIFX 80-RE

Item	CIFX 80-RE
System Interface	Compact PCI, 32-Bit width for the data access to the Dual-Port Memory (DPM), or DMA (Direct Memory Access)
Dual-Port Memory Size	64 KBytes
Function	Communication interface with Compact PCI and Real-Time Ethernet interface
Communication	Determined by the loaded firmware
Protocols	EtherCAT Master, EtherCAT Slave, EtherNet/IP-Scanner (Master), EtherNet/IP-Adapter (Slave), Open Modbus/TCP, Powerlink Controlled Node/Slave, PROFINET IO-Controller, PROFINET IO-Device, SERCOS III Master, SERCOS III Slave
Ethernet Frame Types	Ethernet II
Processor	netX 500
LEDs	SYS, COM 0, COM 1, 2x Link, 2x Activity (For more information refer to section <i>LEDs</i> beginning from page 221.)
Configuration Software Real-Time Ethernet Master	SYCONnet
Configuration Software Real-Time Ethernet Slave	netX Configuration Tool
Transmission Rate	10/100 MBit/s, Auto-Negotiation, Cross-Over, Halfduplex/Fullduplex (100 MBit/s)
Ethernet Interface	RJ45 Socket, 10 Base-T, 100 Base-TX, potential free
Power Supply	+3.3 V dc ± 5 %/max. 650 mA
Dimensions (L x W x D)	162,2 x 100 x 20 mm
Operating Temperature	-20 °C ... +70 °C
Environement	The device must be used in a pollution degree 2 environment.

Table 122: Technical Data CIFX 80-RE

13.1.4 CIFX 90-RE\F

Item	CIFX 90-RE\F
System Interface	Mini-PCI, 32-Bit width for the data access to the Dual-Port Memory (DPM), or DMA (Direct Memory Access)
Dual-Port Memory Size	64 KBytes
Function	Communication interface with Mini-PCI-Socket and Real-Time Ethernet interface
Communication	Determined by the loaded firmware
Protocols	EtherCAT Master, EtherCAT Slave, EtherNet/IP-Scanner (Master), EtherNet/IP-Adapter (Slave), Open Modbus/TCP, Powerlink Controlled Node/Slave, PROFINET IO-Controller, PROFINET IO-Device, SERCOS III Master, SERCOS III Slave
Ethernet Frame Types	Ethernet II
Processor	netX 500
LEDs	SYS (For more information refer to section <i>LEDs</i> beginning from page 221.)
Configuration Software Real-Time Ethernet Master	SYCONnet
Configuration Software Real-Time Ethernet Slave	netX Configuration Tool
Transmission Rate	10/100 MBit/s, Auto-Negotiation, Cross-Over, Halfduplex/Fullduplex (100 MBit/s) Depending on used firmware
Interface AIFX-RE	Cable Connector Ethernet for connecting assembly interface AIFX-RE
Power Supply	+3.3 V dc ± 5 %/max. 650 mA
Dimensions (L x W x D)	60 x 45 x 9,5 mm
Operating Temperature	-20 °C ... +70 °C
Environement	The device must be used in a pollution degree 2 environment.

Table 123: Technical Data CIFX 90-RE\F

13.1.5 CIFX 90E-RE\F

Item	CIFX 90E-RE\F
System Interface	Mini-PCI-Express, Single-Lane-Port, 32-Bit width for the data access to the Dual-Port Memory (DPM)
Dual-Port Memory Size	64 KBytes
Function	Communication interface with Mini-PCI-Express and Real-Time Ethernet interface
Communication	Determined by the loaded firmware
Protocols	EtherCAT Master, EtherCAT Slave, EtherNet/IP-Scanner (Master), EtherNet/IP-Adapter (Slave), Open Modbus/TCP, Powerlink Controlled Node/Slave, PROFINET IO-Controller, PROFINET IO-Device, SERCOS III Master, SERCOS III Slave
Ethernet Frame Types	Ethernet II
Processor	netX 100
LEDs	SYS (For more information refer to section <i>LEDs</i> beginning from page 221)
Configuration Software Real-Time Ethernet Master	SYCONnet
Configuration Software Real-Time Ethernet Slave	netX Configuration Tool
Transmission Rate	10/100 MBit/s, Auto-Negotiation, Cross-Over, Halfduplex/Full duplex (100 MBit/s) Depending on used firmware
Interface AIFX-RE	Cable Connector Ethernet for connecting assembly interface AIFX-RE
Power Supply	+3.3 V dc $\pm 5\%$ /max. 800 mA
Dimensions (L x W x D)	51 x 30 x 11 mm
Operating Temperature	0 °C ... +55 °C
Environment	The device must be used in a pollution degree 2 environment.

Table 124: Technical Data CIFX 90E-RE\F

13.1.6 CIFX 104C-RE, CIFX 104C-RE-R, CIFX 104C-RE\F, CIFX 104C-RE-R\F

Item	CIFX 104C-RE, CIFX 104C-RE-R, CIFX 104C-RE\F, CIFX 104C-RE-R\F
System Interface	PCI-104, 32-Bit width for the data access to the Dual-Port Memory (DPM)
Dual-Port Memory Size	64 KBytes
Function	Communication interface with PCI-104 and Real-Time Ethernet interface
Communication	Determined by the loaded firmware
Protocols	EtherCAT Master, EtherCAT Slave, EtherNet/IP-Scanner (Master), EtherNet/IP-Adapter (Slave), Open Modbus/TCP, Powerlink Controlled Node/Slave, PROFINET IO-Controller, PROFINET IO-Device, SERCOS III Master, SERCOS III Slave
Ethernet Frame Types	Ethernet II
Processor	netX 500
LEDs	SYS, COM 0, COM 1, 2x Link, 2x Activity (For more information refer to section <i>LEDs</i> beginning from page 221.)
Configuration Software Real-Time Ethernet Master	SYCONnet
Configuration Software Real-Time Ethernet Slave	netX Configuration Tool
Transmission Rate	10/100 MBit/s, Auto-Negotiation, Cross-Over, Halfduplex/Fullduplex (100 MBit/s) Depending on used firmware
Ethernet Interface	For CIFX 104C-RE, CIFX 104C-RE-R : RJ45 Socket, 10 Base-T, 100 Base-TX, potential free
Interface AIFX-RE	For CIFX 104C-RE\F, CIFX 104C-RE-R\F : Cable Connector Ethernet for connecting AIFX-RE
Diagnostic Interface	For CIFX 104C-RE\F, CIFX 104C-RE-R\F : Cable Connector DIAG
Power Supply	+5 V dc ± 5 %/max. max. 500 mA oder +3.3 V dc ± 5 %/max. 730 mA
Dimensions (L x W x D)	97 x 91 x 24 mm
Operating Temperature	-20 °C ... +70 °C
Environement	The device must be used in a pollution degree 2 environment.

Table 125: Technical Data CIFX 104C-RE, CIFX 104C-RE-R, CIFX 104C-RE\F, CIFX 104C-RE-R\F

13.1.7 CIFX 104-RE, CIFX 104-RE-R, CIFX 104-RE\F, CIFX 104-RE-R\F

Item	CIFX 104-RE, CIFX 104-RE-R, CIFX 104-RE\F, CIFX 104-RE-R\F
System Interface	PC/104, 32-Bit Dual-Port-Memory
Dual-Port Memory Size	16 KBytes
Function	Communication interface with PC/104 and Real-Time Ethernet interface
Communication	Determined by the loaded firmware
Protocols	EtherCAT Master, EtherCAT Slave, EtherNet/IP-Scanner (Master), EtherNet/IP-Adapter (Slave), Open Modbus/TCP, Powerlink Controlled Node/Slave, PROFINET IO-Controller, PROFINET IO-Device, SERCOS III Master, SERCOS III Slave
Ethernet Frame Types	Ethernet II
Processor	netX 500
LEDs	SYS, COM 0, COM 1, 2x Link, 2x Activity (For more information refer to section <i>LEDs</i> beginning from page 221).
Configuration Software RE Master	SYCONnet
Configuration Software RE Slave	netX Configuration Tool
Transmission Rate	10/100 MBit/s, Auto-Negotiation, Cross-Over, Halfduplex/Fullduplex (100 MBit/s) Depending on used firmware
Ethernet Interface	For CIFX 104-RE, CIFX 104-RE-R : RJ45 Socket, 10 Base-T, 100 Base-TX, potential free
Interface AIFX-RE	For CIFX 104-RE\F, CIFX 104-RE-R\F : Cable Connector Ethernet for connecting AIFX-RE
Diagnostic Interface	For CIFX 104-RE\F, CIFX 104-RE-R\F : Cable Connector DIAG
Power Supply	+5 V ± 5 %/max. 500 mA
Dimensions (L x W x D)	97 x 91 x 24 mm
Operating Temperature	-20 °C ... +70 °C
Environement	The device must be used in a pollution degree 2 environment.

Table 126: Technical Data CIFX 104-RE, CIFX 104-RE-R, CIFX 104-RE\F, CIFX 104-RE-R\F

13.1.8 AIFX-RE

Item	AIFX-RE
Function	Assembly interface Ethernet
Interface cifX Cards Real-Time Ethernet	For: CIFX 90-RE\F, CIFX 90E-RE\F, CIFX 104C-RE\F, CIFX 104C-RE-R\F, CIFX 104-RE\F, CIFX 104-RE-R\F: Cable Connector Ethernet for connecting AIFX-RE
LEDs	COM 0, COM 1 (on the back side of the device, for more information refer to section <i>LEDs</i> beginning from page 221)
Transmission Rate	10/100 MBit/s, Auto-Negotiation, Cross-Over, Halfduplex/Full duplex (100 MBit/s) Depending on used firmware
Ethernet Interface	RJ45 Socket, 10 Base-T, 100 Base-TX, potential free
Dimensions (L x W x D)	30,7 x 42,3 x 18,5 mm
Operating Temperature	-20 °C ... +70 °C
Environement	The device must be used in a pollution degree 2 environment.

Table 127: Technical Data AIFX-RE

13.1.9 AIFX-DIAG

Item	AIFX-DIAG
Function	Diagnostic Interface
Diagnostic Interface	For: CIFX 104C-RE\F, CIFX 104C-RE-R\F, CIFX 104-RE\F, CIFX 104-RE-R\F: Cable Connector DIAG
Dimensions (L x W x D)	20,5 x 52,7 x 18,5 mm
Operating Temperature	-20 °C ... +70 °C
LEDs	SYS, COM 0/COM 1 (Real-Time Ethernet), ON
Environement	The device must be used in a pollution degree 2 environment.

Table 128: Technical Data AIFX-DIAG

13.2 PCI IDs cifX Cards on the PCI Bus

On the PCI bus the cifX cards have the following PCI IDs:

PCI IDs	Value
VendorID	0x15CF
DeviceID	0x0000
Subsystem Vendor ID	0x0000
Subsystem Device ID	0x0000

Table 129: PCI IDs cifX Cards on the PCI Bus

13.3 Protocols

13.3.1 EtherCAT Master

Parameter	Description
Maximum number of cyclic input data	5760 bytes
Maximum number of cyclic output data	5760 bytes
Minimum bus cycle time	1 ms (fix)
Acyclic communication	CoE (CANopen over EtherCAT) CoE-Upload, CoE-Download max. 1500 bytes
Functions	Max. 200 Slaves Get OD List Emergency Slave diagnostics
Topology	Line
Baud rate	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Configuration File (ethercat.xml)	Max. 1 MByte
Limitations	The size of the bus configuration file is limited by the size of the RAM Disk (1 Megabyte) Only Ethernet Port 0 of the device is used for communication All CoE Uploads, Downloads and information services must fit in one TLR-Packet. Fragmentation is not supported. Support of Distributed clocks (Slave synchronisation) is always activated. The bus cycle time is fixed to a value of 1000 μs. The watchdog time is fixed to a value of 20 ms.

Table 130: Technical Data EtherCAT Master Protocol

13.3.2 EtherCAT Slave

Parameter	Description
Maximum number of cyclic input data	200* bytes (netX 100/netX 500)
Maximum number of cyclic output data	200* bytes (netX 100/netX 500)
Acyclic communication	SDO SDO Master-Slave SDO Slave-Slave (depending on Master capability)
Type	Complex Slave
Functions	Emergency
FMMUs	3 (netX 100/netX 500)
SYNC Manager	4 (netX 100/500)
Baud rate	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Limitation	LRW is not supported

Table 131: Technical Data EtherCAT Slave Protocol



Note: * The loadable firmware supports for the number of cyclic input data and for cyclic output data in total up to 400 bytes. If more than 200 bytes for input data or for output data should be exchanged via EtherCAT, then a customer specific XML file is necessary. Additionally the following formular applies: $(\text{number of input bytes} + 3) / 4 + (\text{number of output bytes} + 3) / 4$ must be less or equal to 100.

13.3.3 EtherNet/IP Scanner (Master)

Parameter	Description
Maximum number of EtherNet/IP connections	64 connections for implicit and explicit
Maximum number of total cyclic input data	5712 bytes
Maximum number of total cyclic output data	5760 bytes
Maximum number of cyclic input data	504 bytes per slave per telegram
Maximum number of cyclic output data	504 bytes per slave per telegram
IO Connection type	Cyclic, minimum 1 ms (depending on used number of connections and used number of input and output data)
Maximum number of unscheduled data	1400 bytes per telegram
UCMM, Class 3	Supported
Explicit Messages, Client and Server Services	Get_Attribute_Single/All Set_Attribute_Single/All
Predefined standard objects	Identity Object Message Route Object Assembly Object Connection Manager Ethernet Link Object TCP/IP Object
Maximal number of user specific objects	20
DHCP	Supported
BOOTP	Supported
Baud rates	10 and 100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Integrated switch	Supported
Limitations	CIP Sync Services are not implemented TAGs are not supported ACD (Address Conflict Detection) not supported DLR not supported (ring topology)
Reference to firmware/stack version	V2.2.x.x

Table 132: Technical Data EtherNet/IP Scanner (Master) Protocol

13.3.4 EtherNet/IP Adapter (Slave)

Parameter	Description
Maximum number of input data	504 bytes
Maximum number of output data	504 bytes
IO Connection	1 explicit owner, up to 2 listen only
IO Connection type	Cyclic, minimum 1 ms
Explicit Messages	Get_Attribute, Set_Attribute
UCMM	supported
Max. number of user specific objects	20
Max. number of connections	8, explicit and implicit connections
Predefined standard objects	Identity Object Message Route Object Assembly Object Connection Manager Ethernet Link Object TCP/IP Object
DHCP	supported
BOOTP	supported
Baud rates	10 and 100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Integrated switch	yes
Limitations	CIP Sync Services are not implemented TAGs are not supported ACD (Address Conflict Detection) not supported DLR not supported (ring topology)

Table 133: Technical Data EtherNet/IP Adapter (Slave) Protocol

13.3.5 Open Modbus/TCP

Parameter	Description
Maximum number of input data	5760 bytes
Maximum number of output data	5760 bytes
Acyclic communication	Read/Write Register, Max. 125 Registers per Read Telegram (FC 3, 4, 23), Max. 121 Registers per Write Telegram (FC 23), Max. 123 Registers per Write Telegram (FC 6) Read/Write Coil, Max. 2000 Coils per Read Telegram (FC 1, 2), Max. 1968 Coils per Write Telegram (FC 15)
Modbus Function Codes	1, 2, 3, 4, 5, 6, 7, 15, 16, 23
Mode	Message Mode: Client, Server (I/O data area is not used in this mode) I/O Mode: Server
Baud rates	10 and 100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3

Table 134: Technical Data Open Modbus/TCP Protocol

13.3.6 Powerlink Controlled Node/Slave

Parameter	Description
Maximum number of cyclic input data	1490 bytes
Maximum number of cyclic output data	1490 bytes
Acyclic data transfer	SDO Upload/Download
Functions:	SDO over ASND and UDP
Baud rate	100 MBit/s, half-duplex
Data transport layer	Ethernet II, IEEE 802.3
Ethernet Powerlink version	V 2
Limitation	No slave to slave communication

Table 135: Technical Data POWERLINK Controlled Node (Slave) Protocol

13.3.7 PROFINET IO-RT-Controller

Parameter	Description
Maximum number of PROFINET IO Devices	128
Maximum number of total cyclic input data	5712 bytes
Maximum number of total cyclic output data	5760 bytes
Maximum number of cyclic input data	1024 bytes per device (= IOCR data length)
Maximum number of cyclic output data	1024 bytes per device (= IOCR data length)
Acyclic communication	Read/Write Record Limited to 1392 bytes per telegram Limited to 4096 bytes per request
Alarm processing	Supported
Diagnostic data	One 200 byte buffer per IO device
Supported Protocols	RTC – Real Time Cyclic Protocol, Class 1 RTA – Real Time Acyclic Protocol DCP – Discovery and configuration Protocol CL-RPC – Connectionless Remote Procedure Call
Context management by CL-RPC	Supported
Minimum cycle time	1 ms Different IO-Devices can be configured with different cycle times
Baud rate	100 MBit/s Full-Duplex mode
Data transport layer	Ethernet II, IEEE 802.3
Configuration file	Maximum 1 MByte
Limitations	RT over UDP not supported Multicast communication not supported DHCP is not supported Only one IOCR per IO Device NameOfStation of IO Controller CANNOT be set using the DCP SET NameOfStation service but only at start-up while configuring the IO Controller SNMP not supported LLDP not supported The buffer for IO-Device diagnosis data will be overwritten in case of multiple diagnostic events. Only one (the last) event is stored at the same time. If a single event produces more than 200 bytes of diagnosis data, only the first 200 bytes will be taken care of. The usable (minimum) cycle time depends on the number of used IO Devices, the number of used input and output data. The cycle-time, the number of configured IO Devices and the amount of IO data depend on each other. For example it is not possible due to performance reasons to have 128 IO Devices communication with cycle-time 1ms. The size of the bus configuration file is limited by the size of the RAM Disk (1 MByte) Only one API (API = 0) is supported. Any Profile requesting a different API is currently not supported. The IO-Device feature "FastStartUp" can not be used WriteMultiple-Record service is not supported
Reference to firmware/stack version	V2.4.x.x

Table 136: Technical Data PROFINET IO RT Controller

13.3.8 PROFINET IO-RT-Device

Parameter	Description
Maximum number of cyclic input data	1024 bytes
Maximum number of cyclic output data	1024 bytes
Maximum number of all submodules	80
Maximum slot address	300
Maximum subslot address	100
Acyclic communication	Read/Write Record, max. 1024 bytes per telegram
Alarm Types	Process Alarm, Diagnostic Alarm, Return of SubModule, Plug Alarm, Pull Alarm
Supported protocols	RTC – Real Time Cyclic Protocol, Class 1 RTA – Real Time Acyclic Protocol DCP – Discovery and configuration Protocol CL-RPC – Connectionless Remote Procedure Call LLDP – Link Layer Discovery Protocol SNMP – Simple Network Management Protocol
Used Protocols (subset)	UDP, IP, ARP, ICMP (Ping)
Topology recognition	LLDP, SNMP V1, MIB2, physical device
VLAN- and priority tagging	yes
Context Management by CL-RPC	Supported
Minimum cycle time	1ms IO-Device can be configured with different cycle times
Baud rate	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Limitations	RT over UDP not supported IRT not supported Multicast communication not supported Only one device instance is supported DHCP is not supported

Table 137: Technical Data PROFINET IO RT Device Protocol

13.3.9 SERCOS III Master

Parameter	Description
Maximum number of cyclic input data	5760 bytes (including Connection Control per Connection)
Maximum number of cyclic output data	5760 bytes (including Connection Control per Connection)
Maximum number of configured slave devices	511
Minimum cycle time	250 µs
Acyclic communication	Service channel: Read/Write/Commands
Functions	Bus Scan
Communication phases	NRT, CP0, CP1, CP2, CP3, CP4
Topology	Line and double ring
Redundancy	supported
Baud rate	100 MBit/s, full duplex
Data transport layer	Ethernet II, IEEE 802.3
Auto crossover	supported
Supported SERCOS III version	Communication Specification Version 1.1.1/1.1.2
Limitations	NRT channel not supported Hot-Plug not supported Cross Communication not supported

Table 138: Technical Data SERCOS III Master Protocol

13.3.10 SERCOS III Slave

Parameter	Description
Maximum number of cyclic input data (Tx) of all slaves	200 bytes (including Connection Control)
Maximum number of cyclic output data (Rx) of all slaves	200 bytes (including Connection Control)
Maximum number of slave devices	8
Maximum number of applicable SERCOS addresses	512 (1 ... 511)
Minimum cycle time	250 µs
Topology	Line and ring
Communication phases	NRT, CP0, CP1, CP2, CP3, CP4
Acyclic Communication (Service Channel)	Read/Write/Standard Commands
Baud rate	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
Supported SERCOS III version	Communication Specification Version 1.1.2
Supported SERCOS Communication Profiles	SCP_FixCFG Version 1.1.1 SCP_VarCFG Version 1.1.1 SCP_VarCFG Version 1.1.3
Supported User SCP Profiles	SCP_WD Version 1.1.1 SCP_Diag Version 1.1.1 SCP_RTb Version 1.1.1 SCP_Mux Version 1.1.1 SCP_Sig
Supported FSP profiles	FSP_IO FSP_Drive
SCP Sync support	yes
SCP_NRT support	No (planned)
Identification LED feature supported	yes
Storage location of object dictionary	mixed mode
Firmware/stack available for netX	netX50, netX100, netX500
Limitations	Max. 2 connections: 1 for consumer and 1 for producer Modifications of the Service-Channel Object Dictionary are volatile after reset (if resides on device) Hot plug is not supported yet Cross communication not supported yet NRT Channel is not supported yet The Ethernet Interface is not supported yet.
Reference to firmware/stack version	V3.0.x.x

Table 139: Technical Data SERCOS III Slave Protocol

14 Annex

14.1 Matrix Label

A matrix label is on the device. It contains 3 items:

1. Part number
2. Hardware Revision
3. Serial number

The figure shows part number 1250.100, hardware revision 3 and serial number 23456.



Figure 98: Matrix Label

14.2 EtherCAT Summary over Vendor ID, Conformance test, Membership and Network Logo

14.2.1 Vendor ID

The communication interface product is shipped with Hilscher's secondary vendor ID, which has to be replaced by the Vendor ID of the company shipping end products with the integrated communication interface. End Users or Integrators may use the communication interface product without further modification if they re-distribute the interface product (e.g. PCI Interface card products) only as part of a machine or machine line or as spare part for such a machine. In case of questions, contact Hilscher and/or your nearest ETG representative. The ETG Vendor-ID policies apply.

14.2.2 Conformance

EtherCAT Devices have to conform to the EtherCAT specifications. The EtherCAT Conformance Test Policies apply, which can be obtained from the EtherCAT Technology Group (ETG, www.ethercat.org).

Hilscher range of embedded network interface products are conformance tested for network compliance. This simplifies conformance testing of the end product and can be used as a reference for the end product as a statement of network conformance (when used with standard operational settings). It must however be clearly stated in the product documentation that this applies to the network interface and not to the complete product.

Conformance Certificates can be obtained by passing the conformance test in an official EtherCAT Conformance Test lab. Conformance Certificates are not mandatory, but may be required by the end user.

14.2.3 Certified Product vs. Certified Network Interface

The EtherCAT implementation may in certain cases allow one to modify the behavior of the EtherCAT network interface device in ways which are not in line with EtherCAT conformance requirements. For example, certain communication parameters are set by a software stack, in which case the actual software implementation in the device application determines whether or not the network interface can pass the EtherCAT conformance test. In such cases, conformance test of the end product must be passed to ensure that the implementation does not affect network compliance.

Generally, implementations of this kind require in-depth knowledge in the operating fundamentals of EtherCAT. To find out whether or not a certain type of implementation can pass conformance testing and requires such testing, contact EtherCAT Technology Group ("ETG", www.ethercat.org) and/or your nearest EtherCAT conformance test centre. EtherCAT may allow the combination of an untested end product with a conformant network interface. Although this may in some cases make it possible to sell the end product without having to perform network conformance tests, this approach is generally not endorsed by Hilscher. In case of questions, contact Hilscher and/or your nearest ETG representative.

14.2.4 Membership and Network Logo

Generally, membership in the network organization and a valid Vendor-ID are prerequisites in order to be able to test the end product for conformance. This also applies to the use of the EtherCAT name and logo, which is covered by the ETG marking rules.

Vendor ID Policy accepted by ETG Board of Directors, November 5, 2008

14.3 References

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16 Glossary

AIFX

Assembly InterFace based on netX

Auto-Negotiation

Auto-Negotiation is a feature of an interface: An interface with Auto-Negotiation will automatically determine a set of correct communication parameters.

Baud rate

Data transmission speed of a communication channel or interface.

CIFX

Communication InterFace based on netX

cifX Card Real-Time Ethernet

PC cards for the Real-Time Ethernet systems EtherCAT, EtherNet/IP, Open-Modbus/TCP, Powerlink, PROFINET IO-RT or SERCOS III as Communication Interface netX with PCI Bus

- PCI (CIFX50),
- PCI Express (CIFX 50E),
- Compact PCI (CIFX80),
- Mini PCI (CIFX90),
- Mini PCI Express (CIFX 90E),
- PCI 104 (CIFX 104C)

and as Communication Interface netX with ISA Bus

- PC/104 (CIFX 104)

Coil

A coil (in the meaning defined by Modbus terminology) is a single bit in memory that can be accessed (i.e. read or write) via Modbus.

Device Description File

A file containing configuration information about a device being a part of a network that can be read out by masters for system configuration. Device Description Files use various formats which depend on the communication system. Often these formats are based on XML such as EDS_files or GSDML_files. Contains configuration information

DPM

Dual-Port Memory

EDS

Electronic Data Sheet

XML based device description file.

EDS file

A special kind of Device Description File used by EtherNet/IP.

EtherCAT

A communication system for industrial Ethernet designed and developed by Beckhoff Automation GmbH.

EtherNet/IP

A communication system for industrial Ethernet designed and developed by Rockwell. It partly uses the CIP (Common Industrial Protocol).

Ethernet Powerlink

A communication system for industrial Ethernet designed and developed by B&R. It partly uses CANopen technologies.

Full duplex

Full duplex denominates a telecommunication system between two communication partners which allows simultaneous communication in both directions is called a full-duplex telecommunication system. At such a system, it is possible to transmit data even if currently data are received. Full-duplex is the opposite of Half_duplex.

Function code

A function code (in the meaning defined by Modbus terminology) is a standardized method to access (i.e. read or write) coils or registers via Modbus.

GSDML

General Station Description Markup Language
XML based device description file.

GSDML file

A special kind of XML-based Device Description File used by PROFINET.

Half duplex

Half duplex denominates a telecommunication system between two communication partners which does not allow simultaneous, but alternating, communication in both directions is called a half-duplex telecommunication system. At such a system, receiving data inhibits the transmission of data. Half-duplex is the opposite of _Full_duplex.

Hub

A network component connecting multiple communication partners with each other. A hub does not provide own intelligence, thus it does not analyze the data traffic and sends received data to all connected communication partners. A hub can be used for setting up a star topology.

Industrial Ethernet

See Real-Time Ethernet

netX

networX on chip, next generation of communication controllers

netX Configuration Tool

The netX Configuration Tool allows users to operate cifX or netX based devices in different networks. Its graphical user interface serves as a configuration tool for the installation, configuration and Diagnostic of the devices.

Object Dictionary

An object dictionary is a storage area for device parameter data structures. It is accessed in standardized manner.

Open Modbus/TCP

A communication system for Industrial Ethernet designed and developed by Schneider Automation and maintained by the Modbus-IDA organization based on the Modbus protocols for serial communication.

PCB

Printed Circuit Board, (gedruckte=maschinell gefertigte) Schaltungsplatine

PROFINET

A communication system for Industrial Ethernet designed and developed by PROFIBUS International. It uses some mechanisms similar to those of the PROFIBUS field bus.

RE

RE stands for Real-Time Ethernet

Real-Time Ethernet

Real-Time Ethernet (Industrial Ethernet) is an extension of the Ethernet networking technology for industrial purposes with very good real-time features and performance. There is a variety of different Real-Time Ethernet systems on the market which are incompatible with each other. The most important systems of these are

- EtherCAT
- EtherNet/IP
- Ethernet Powerlink
- Open Modbus/TCP
- PROFINET
- SERCOS III

Register

A register (in the meaning defined by Modbus terminology) is a 16-bit wide storage area for data which can be accessed and addressed as a unit by some of the Modbus Function Codes.

SERCOS III

A communication system for industrial Ethernet designed and developed by Bosch-Rexroth and supported by SERCOS International.

Switch

A network component connecting multiple communication partners (or even entire branches of a network) with each other. A switch is an intelligent network component which analyzes network traffic in order to decide on its own. For the connected communication partners a switch behaves transparently.

SYNC

Synchronisation cycle of the master

TCP/IP

Transport Control Protocol/Internet Protocol connection-orientated, secure transfer protocol as basis for the Internet-protocols

UCMM

Unconnected Message Manager

XDD file

A special kind of Device Description file used by Ethernet Powerlink.

XML

XML means Extended Markup Language. It is a symbolic language for structuring data systematically. XML is standard maintained by the W3C (World-wide web consortium). Device Description Files often use XML-based formats for storing the device-related data appropriately.

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